MOTOR AGE

Vol. XXXII
No. 7

CHICAGO, AUGUST 16, 1917

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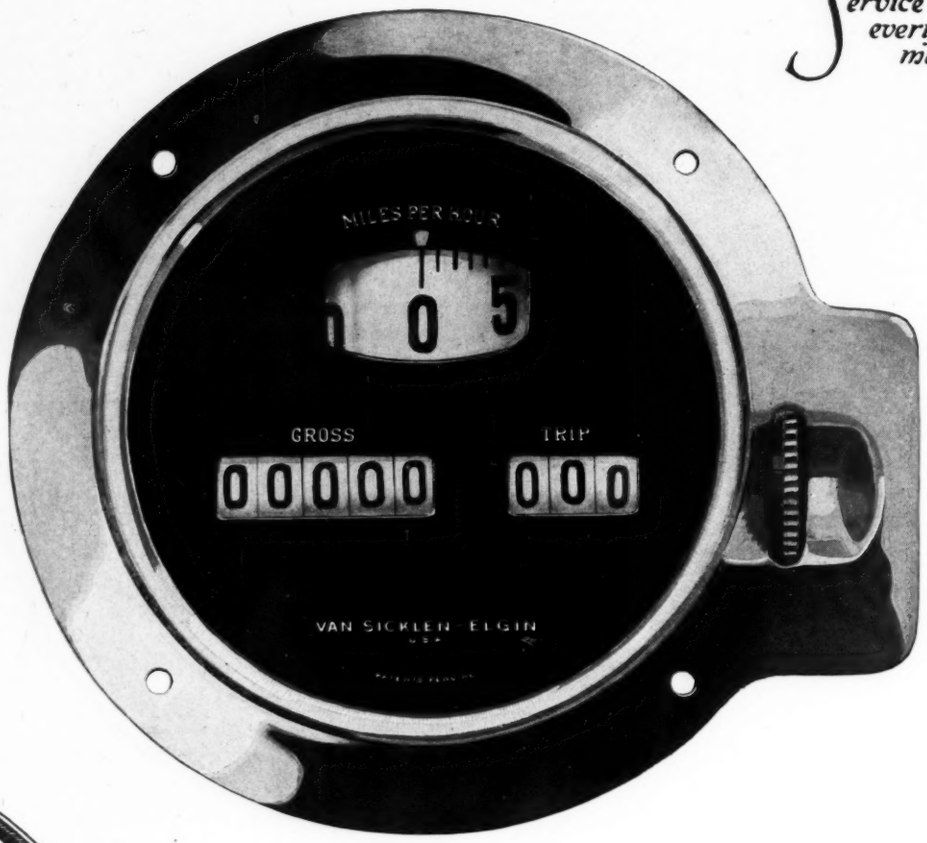

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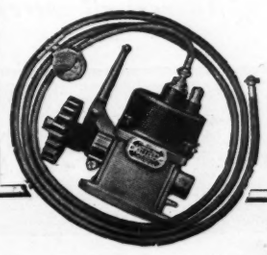

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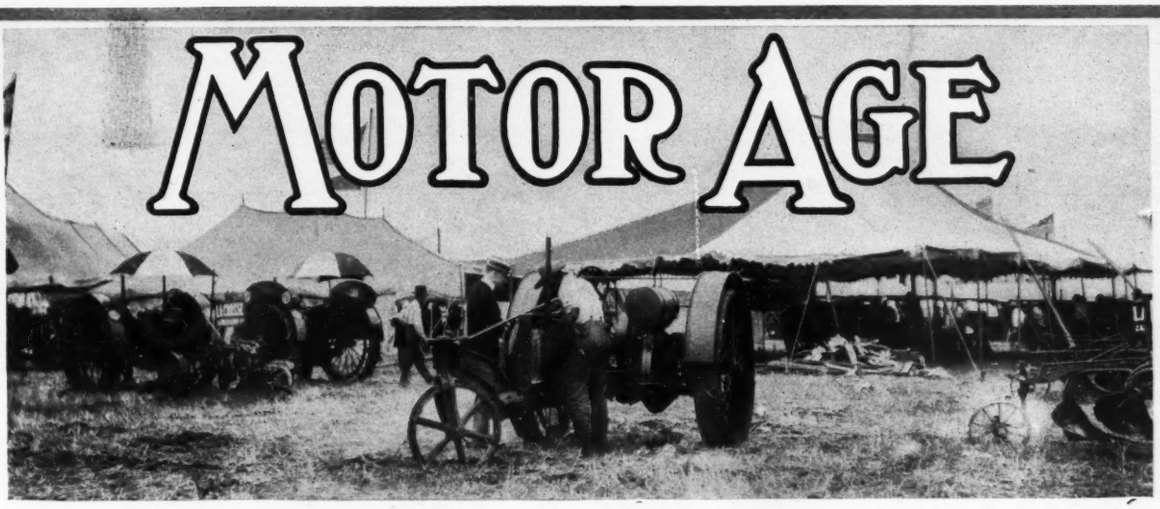


Tractor Trials Not Instructive

Many Types, Some Construction Progress But Little Information

By Darwin S. Hatch

FREMONT, Neb., Aug. 10—Prospective tractor purchasers who attended the five-day demonstration of farm tractors, which closed here to-day, did not get as much real information of assistance to them in their decisions as to which tractor to purchase as they were entitled to or as was possible. There were not so many farmers or dealers present at the demonstrations this year as there were at Fremont last year, and those who did not attend missed only a good opportunity to view between 200 and 300 machines of some forty-two different makes, but did not miss much else. The demonstrations did not give them an opportunity of getting an accurate conception of what any one make of machine could do as compared with any other make. The plowing trials were neither sufficiently strenuous nor properly arranged to let visitors know which machines were well constructed and designed and which were not.

There were plenty of tractors on hand, but there were not two days of real work done by the tractors in the five days of the demonstration. The arrangement of the demonstrations was not such as would permit the observer to get a line on the ability of the tractor. They could plow about as they pleased, having a small plot of ground allotted to each, and seemingly an unlimited period to plow it in. On Monday and Tuesday there was no plowing at all on account of the rain storms Saturday and Monday. Wednesday the plowing started at 10 o'clock and there was a little more on Thursday and to-day.

After watching the machines plow, one had no record as to how much land they could plow per hour, how much gasoline or kerosene they used per acre, how rapidly they could travel, or whether they had, or had not, mechanical difficulties in plowing. Seemingly, each tractor could set its own standard of work and no one could tell definitely the actual performance. Many of the tractor men pointed with pride to the fact that their allotment was plowed without a stop, but you had to take their word for it as there was no record. About the only thing that really left conclusive evidence was the straightness of the furrow of which some of the tractor makers were entitled to boast, but this was as much to the credit of the operator as it was to the credit of the tractor.

Attendance fell below that of last year, both as to the total number in attendance and the number of dealers; probably also, it fell below the 1916 demonstration at Fremont in the point of business transacted, either by direct sales to farmers or contracts closed up with dealers.

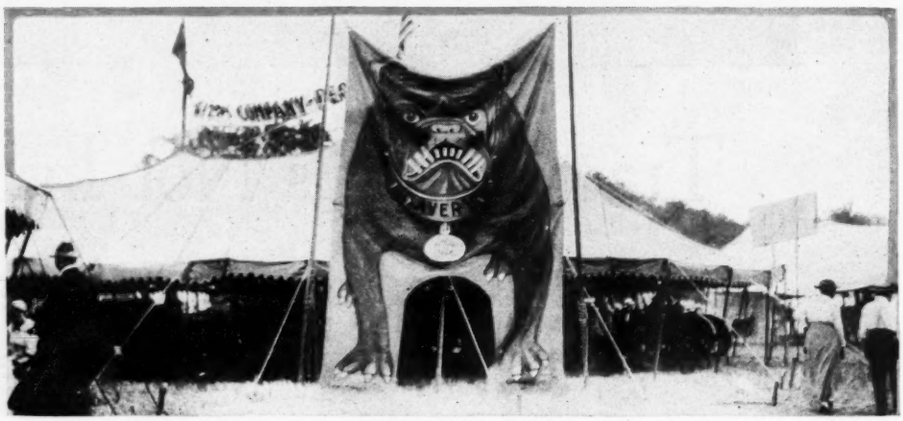
The falling off of attendance can be laid to the fact that the demonstrations in 1916, as of this year, did not provide any real showing as to the comparative capabilities of the different types. It must be admitted, however, that on account of better weather conditions, or for some other reason, the

The tent city near Fremont, Neb., in which were housed the 300 tractors gathered for the plowing

tractors showed up in the plowing demonstrations a year ago better than they did this year.

Consequently the demonstrations did not develop news of national interest which the national publications, and particularly the daily papers, could feature; consequently, interest throughout the country lagged and was rather local than national. No awards of any nature were made and little information was given out. There was no information developed by which tractor efficiency could be compared with that of animal power on the farm, nor any of the answers to questions of national importance in the way of food conservation or saving in man power. Tractor makers are therefore disappointed in the results of the trials.

There were, however, many interests represented at Fremont this week to whom real information would be of greatest value, and through whom the mission of the tractor could have been given with greatest benefit to the industry. The French government was represented in the person of Lieut. Paul Mittine, head of the Motor and Public Works Department of the French Purchasing Commission, General Baldin of the Technical Department of the Russian Government, accompanied by several army officers and automotive engineers; J. L. Kennedy of Mexico City,



Avery's bulldog was a landmark of "The Midway," the main street of the tent city of the tractor plowing exhibitions

Blake Ozias, manager F. S. Bennett, Ltd., London, England, a leading importer of motor cars and agricultural implements, B. J. Constant of Toronto, Canada, and others from European and South American countries.

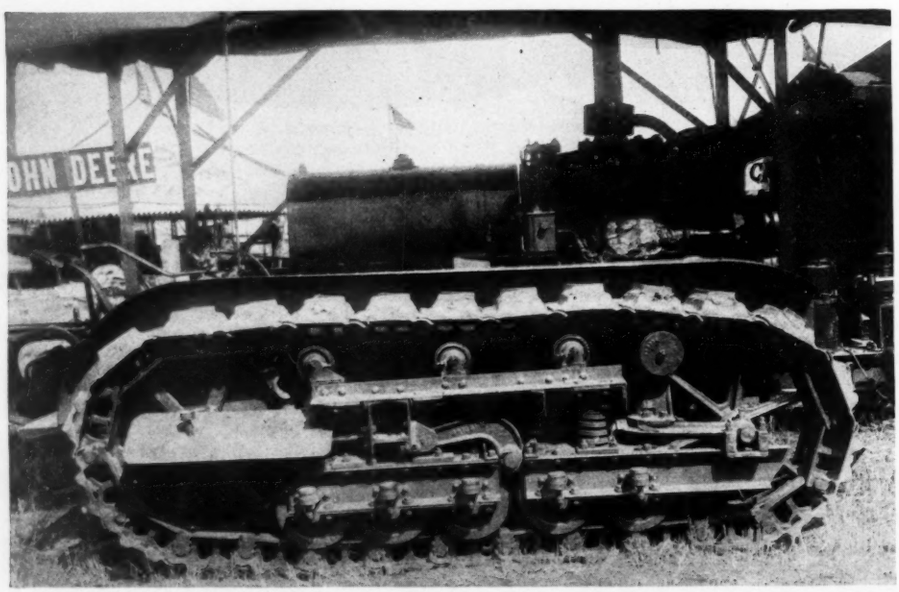
Our own government was represented by Arnold P. Yerkes of the Bureau of Farm Management of the Department of Agriculture, Juan Homs, commercial agent of the Department of Commerce and Howard E. Coffin, chairman Aircraft Production Board, Council of National Defense.

One outstanding feature of the demonstration is the fact that there were over 200 engineers and others representing motor car and motor truck parts on hand. This was the first tractor demonstration at which the motor car industry has been represented in force. These men spent the five days in studying the various machines with a view to getting into the tractor industry.

New Tractor Rumors

Over a dozen great motor car companies had their engineers present at the show and in many cases the chiefs of the organization were on hand. There were general rumors to the effect that several big motor car makers are breaking ground to build tractor factories. This is of importance when it is considered that the Ford is now delivering tractors in quantities to the English and French governments, that General Motors has a Sampson tractor in production, that perhaps ten other concerns are working on experimental models. Disappointment was general in that the tractor of Henry Ford & Son was not exhibited this year, as it was in Fremont that it made its first public appearance last year. Likewise, disappointment was expressed in the fact that the new General Motors production was not on display.

Next year it is hoped that real tractor tests will be held. Many makers are strongly in favor of a strenuous test for 1918, just such a test as were the reliability tests of motor cars eight years ago. Such tests broke up many of the motor cars, but they did a world of good. The maker had to bring out a good machine or



Feature of the Holt caterpillar—the endless track on which it creeps along the ground and upon which the "tanks" are modeled

emonstrations reminded the visitor of a mammoth circus—This hippodrome had horses of steel

Start of the plowing demonstration at Fremont. The tractors are taking their first furrow of the 3,000 acres they were to plow

the buying public would get wise to it. To-day the tractor industry needs such a test and it is to be hoped that 1918 will come across with a test in which a few of the following points will receive attention:

1—Each machine would have to be in all respects a stock tractor and would be examined for such by a special engineering committee.

2—An official observer would accompany each machine and record every stop, amount of fuel used, amount of work done, etc.

3—A dynamometer would be coupled with every machine so that it would be possible to know if every machine was pulling its rated load or not.

4—There would be belt tests as well as horsepower tests to prove the ability of the respective machines.

Among the motor car concerns in the tractor field whose products were on exhibition are J. I. Case T. M. Co., Moline Plow Co., and Velie. A new Cleveland is the product of Rollin White, once with the White Co., Cleveland, Ohio.

Two Tractor Camps

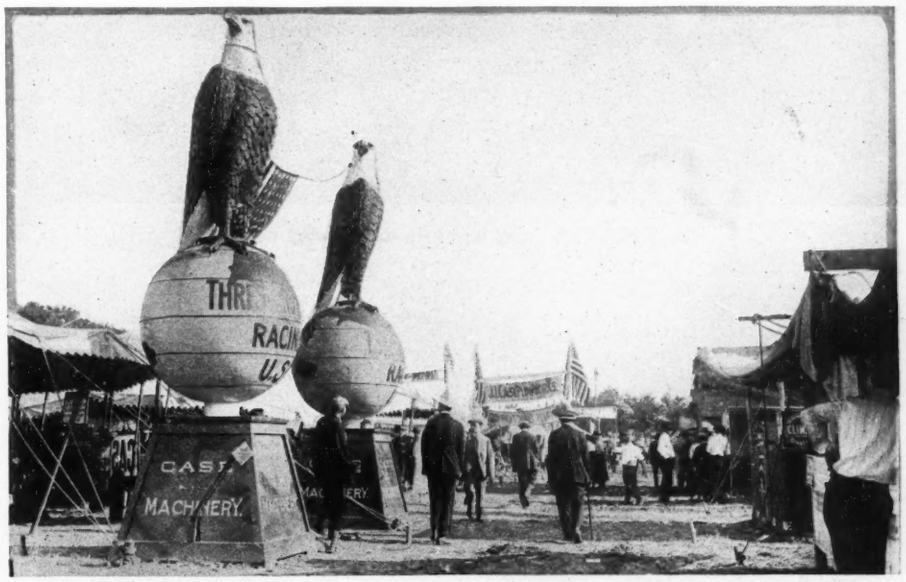
The tractor industry, through the special circumstances of its field, is divided into two camps. This division applies not only in the sales efforts, but to an extent in the engineering and design. These two camps are the implement makers, manufacturing and selling agricultural implements and have built up a wonderful sales and distribution organization on the one hand; on the other, are the newer concerns which are either the outgrowth of motor car concerns, or tractor concerns of recent formation whose products are designed in such a way that they involve the principles of engineering which to a great extent characterize the motor car.

At the present time, the implement maker dominates the field because of his well-earned prestige among farmers and his thorough sales distribution. Some of these implement men are not anxious to see the younger makers which represent the more up-to-date engineering enter tractor production. Others are waiting to see what the motor car industry will do in tractor development. They feel that concerns which have been making motor cars in quantity at a low price, may accomplish similar results in tractor production.

Among the concerns not directly connected with the motor car industry whose machines represent the new ideas of engineering, may be mentioned the J. I. Case Plow Co., whose new Wallis Junior is a very good example of modern engineering in tractor design. Another is the Four-Drive which uses parts made by high-class motor car and truck parts makers throughout. The Joliet Oil Tractor Co., whose Bates Steel Mule appears in a new model, having two track laying creepers instead of a single one as before, is a third. Completeness of inclosure and other elements of design indicate progress. New types developed by the Emerson-Brantingham Co. show improvement in design over previous models. The Wolverine, just brought out by the Wolverine Tractor Co., Detroit, is an example of motor car design in tractor manufacture, such as the inclosure of driving gears and other parts.

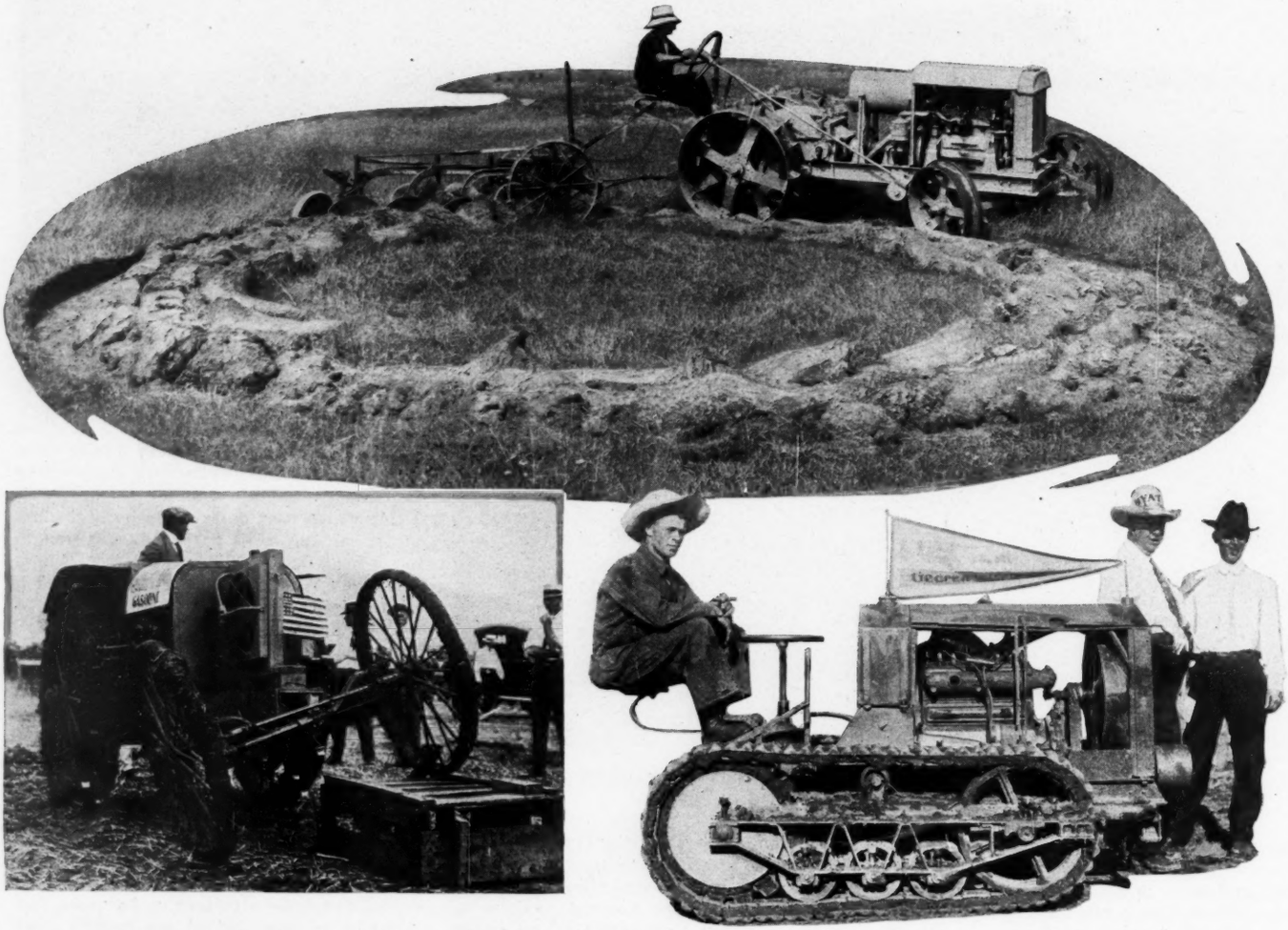
Kerosene Performance

Fully two-thirds of the tractors operated during the demonstrations on kerosene, but it seems evident that at the present time kerosene cannot be made to perform as well as gasoline. There was some improvement in the operation of these machines on kerosene as compared with last year, chiefly through improvement in manifold and engine design. Practically all of the tractors burning kerosene used consider-

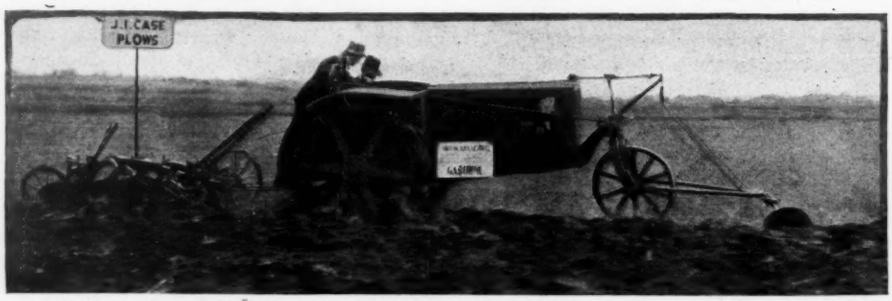


The familiar trademark of the J. I. Case T. M. Co. formed giant portals to the Case exhibit at the tractor demonstrations

Some of the Tractors at Fremont



Above—Wolverine tractor in a plowing stunt to show its short turning radius of 12½ ft. At left—The Parrett climbs an obstruction to show its flexibility. At right—The little Cleveland, a creeper type which made its debut at Fremont



The Wallis Cub doing its bit in the plowing field

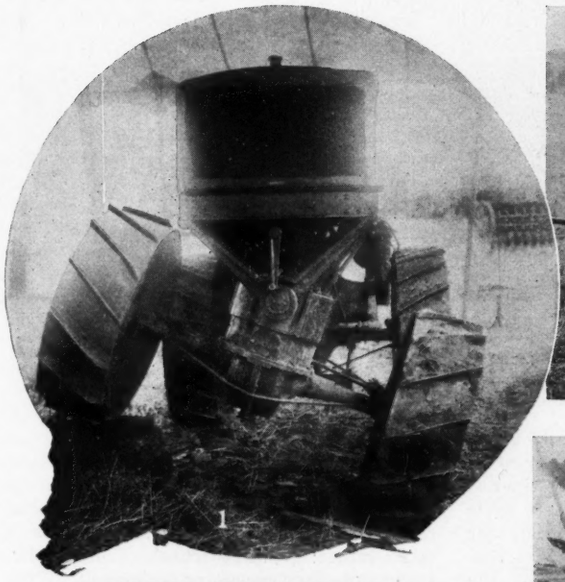
Atlas has an interested following

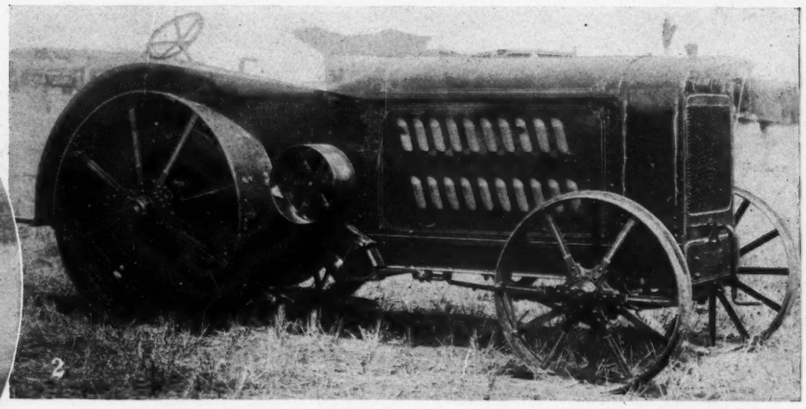
able water in the fuel mixture to prevent pre-ignition. At that, there was more or less pounding and heating.

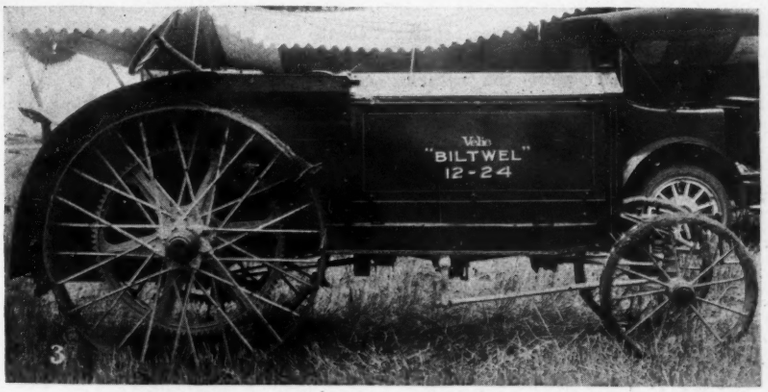
The tractors operating on kerosene had not the flexibility that their gasoline models exhibited. Flexibility is necessary in a tractor in spite of the general impression that the engine can be run at the same speed most of the time. It must have flexibility to take care of differences in the soil for gear-shifting can not be relied upon to overcome temporary variations in the hardness of the soil. There was considerable smoking noted on the part of kerosene burning tractors. This was due both to the unconsumed kerosene and excessive quantity of cylinder oil.

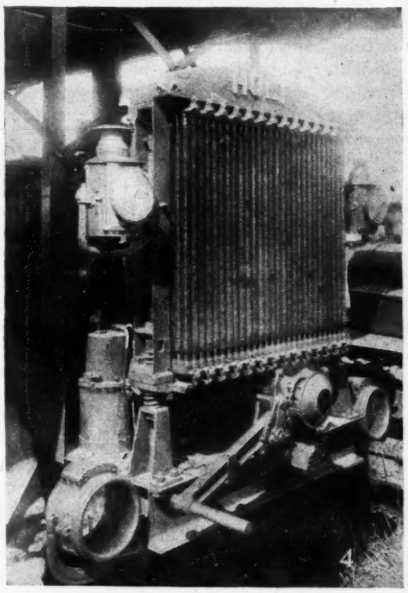
Engineers and Makers

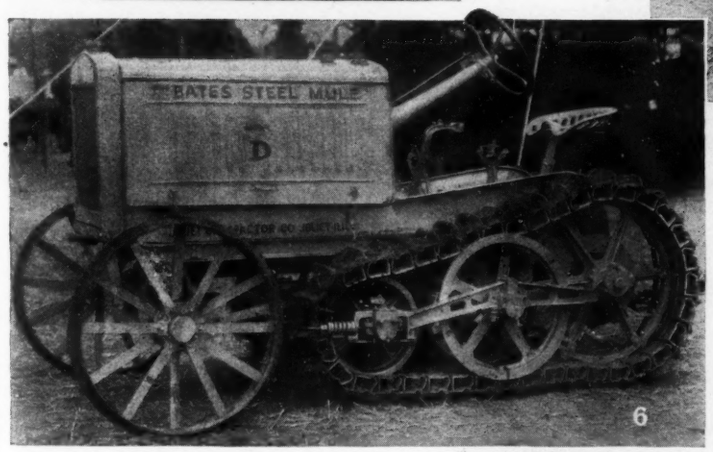
Activity of the Society of Automotive Engineers developed the chief accomplishments of value during the week. The S. A. E. held three engineering meetings and the tractor and parts makers to the number of 400 met at the dinner Wednesday evening, which is reported in detail on other pages. The Society aroused interest in the question of tractor service when it held a special meeting Thursday evening devoted to this subject. The consensus of opinion, seemed to be that service was the biggest problem of the tractor men at present, and its chief remedy should be more reliable

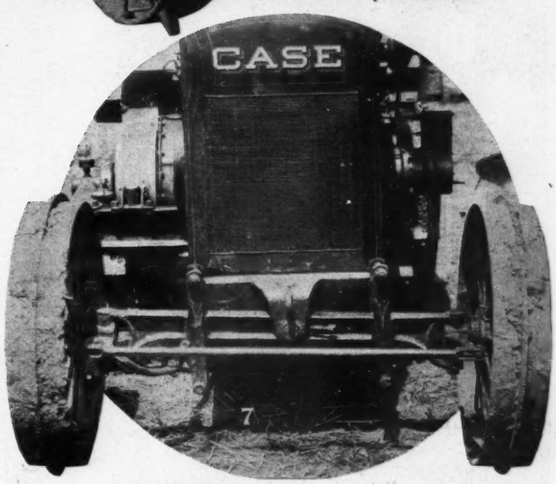












1—Four Drive showing its pivoted suspension. 2—Small model of the Twin City. 3—The Velie Biltwel. 4—How the Holt radiator is hung. 5—Moline Universal driven from the plow seat like a horse. 6—A new double-track design of Bates Steel Mule. 7—Front end of the Case

How three or more tractors are used as a unit for fast work

tractors, education of the farmer in their use rather than free parts and free repairs for the machine after it is sold.

Makers were agreed that the present tractor is not the final one, but that they are generally working as hard as possible to give the best machines, and that in the meantime, something must be done to keep the tractors running as satisfactorily as possible in the hands of the farmers. The farmer gives the machine very poor attention. As yet the tractor is not properly garaged. One tractor maker stated that 90 per cent of the machines are never stored inside, but are left out during all weather. The tractor is the finest piece of workmanship the farmer has, and yet he is giving it the poorest care and attention.

Neglect of Tractors

Cases were cited of where a tractor working every day in a dusty field was not oiled for a week at a time, and a complete set of new bearings was necessary. One maker spent more than the selling price of the tractor in making good parts worn by the sheer carelessness of the owner. This evil is going to be with the tractor dealer and maker for several years to come.

It was agreed that if repair parts could be secured quickly by the farmers, it would greatly help tractor reputations and accelerate the industry. A case was cited of where a farmer lost his entire ripened grain crop due to failure to get spare parts in reasonable time. Another case was cited of where a farmer spent in one season more than two-thirds the cost of the machine.

Many service ideas were suggested by the makers and dealers. One maker suggested that the S. A. E. open tractor supply depots in certain sections where spares for all makes of tractors could be consigned. Such stores would be of much assistance to those tractor makers who have no well established dealers but who have made occasional sales in widely-separated parts of the country, and who should give such owners the assurance that they can get spares quickly. This plan met favor, because the tractor dealer is not a stable quantity at present.

Tractor manufacturers are speculating on whether the motor car dealer will be able to handle the service problem. They argue that at present he is not just qualified for the job. It will be necessary for the dealer to extend his organization some way or other. It is not impossible to see the day when the live dealer will have a ton truck all fitted up with a service equipment, and making regular schedules or hurry-up calls through the country. Such a truck would be equipped similarly to those repair trucks accompanying convoys of motor trucks in France. They have small lathes, grinding wheels, drills, anvil, forge and other necessary equipment. With such an equipment, coupled with the rural telephone systems of to-day, the up-to-date dealer may find his business broadening along very remunerative lines. Manufacturers of tractors are looking to the motor car industry.

From an engineering standpoint, the tractors to be seen at Fremont are as a whole better tractors than those at the demonstration of 1916, but they are not as much better as they could be. There are a few tractors which are really up-to-date mechanisms from an engineering standpoint. Most of these are made by firms who have been in the business comparatively a short time, although some of the older manufacturers who have specialized in tractors have machines which show sound engineering principles. Among these may be mentioned the J. I. Case Plow Co., the Gray company and Dausch company. As was noted last year, the least advancement seems to be among the very large concerns.

Inclosed Gearing

One of the most marked forms of development in tractors is the inclosure of all gearing. Perhaps the next is the very general adoption of the heavy truck type of four-cylinder engine, with most of the special tractor engines of this type showing greater strength and lower speed than is demanded by truck work.

Kerosene carburetion has been touched on in other pages. Development of the use of kerosene for tractors now seems to be up to the engine makers rather than to the carbureter men.

Among the methods of drive the tendency seems to be toward either the four-wheeled type of two-wheel drive, or else the double-tread type of creeper. There are many more of the latter this year, the list including a new Cleveland, new model of the Bates Steel Mule. Then there is of course the Holt caterpillar, a pioneer in this method of drive. Obtaining traction by driving through the four wheels is a feature of the Four-Drive tractor.

Except in the old-style machines, all of which are made by the older concerns, engineering details were much improved, lubrication is better, and protection against

Within the accessory tent. The Splitdorf exhibit of Dixie and Sumter magnetos

dust is improved. Dust collectors in the form of air cleaners for the carbureter rule, and dust collectors on the crankcase breathers are used to a greater extent than previously and probably will become universal.

Facilities for more complete cooling seem to be in evidence through the use of more effective fans, wider fan belts and bigger radiators. There seems to be a quite general improvement in the steering means and other methods of control. The motor truck type of steering is superseding to a great extent the old handwheel and chain which the operator winds up on a drum. Similarly clutch and gearset control has followed motor car and motor truck lines. A greater proportion of the tractors this year are arranged so that the clutch is operated by a pedal instead of the old hand lever, the pedal usually having a lock-out device to prevent the need of shifting back in the neutral when the machine is brought to a stop.

Moline Mechanical Horse

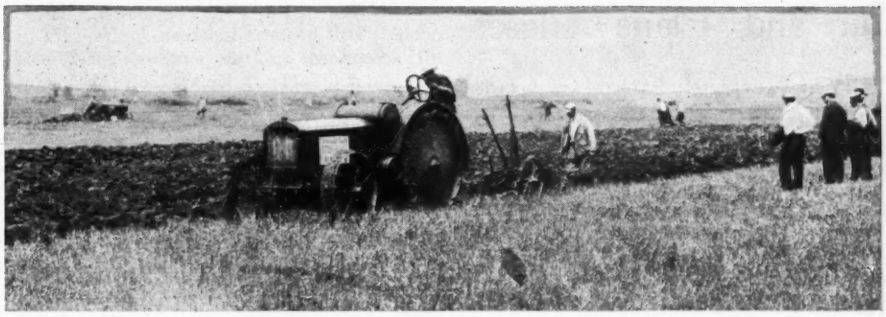
One of the chief things which is making tractor development from an engineering standpoint, a thing of disappointingly slow growth, is the fact that it has been necessary to make a mechanical horse to draw implements designed to be horse-drawn rather than to develop an entirely new machine to perform work in a new way. Until the present, it has been thought necessary in most instances to produce a machine which could be hitched up to what formerly were horse-drawn implements.

One of the successful machines of the year has been the Moline universal, a light powerplant on two wheels, to which may be attached a large variety of implements such that the implement and the powerplant become a complete unit. The tractor in this case becomes in reality a mechanical horse, for the operator sits on the implement operating the tractor from controls which are brought backward to him. This is one way of overcoming the difficulty of applying motor power to farm implements and is utilized in a similar way in the Bates Steel Mule.

It will mean much for the tractor when conditions permit the implements to be redesigned and be made tractor-drawn instead of horse-drawn implements for the two units can be developed together so that they may work together most efficiently. At the present time the tendency is increasing, and each year there is to be seen a greater number and wider variety of implements primarily designed for tractor traction.

Complete motor-driven plowing units, or units for other farm work are in evidence, and the implement men as well as the tractor men, are working on their developments.

Re-designing of the implement so that it will operate most efficiently with motor power is the other way. Some of the implements produced by the International Harvester Co. and designed to be operated by motor, have this idea worked out thoroughly. Among the implements built especially for motor operation by this concern, are binders, for oats and wheat, corn cutters, corn pickers, corn planters and a complete cutting, threshing and sacking outfit for wheat and other small grain has been developed, it is understood.



Small model of Emerson-Brantingham with its large disk wheels

Such progress is along the right line. It is no more logical to attempt to adapt the tractor for application to formerly horse-drawn vehicles, than it would have been to hitch up horses to the hand scythe when domestic animals superseded man power in mowing. Nobody has ever suggested that the tractor should walk on legs just because it replaces the horse. It would be just as logical to expect horse implements without change to make the best use of mechanical traction and power.

In the gearsets, the trend seems to be toward the type which corresponds quite closely to that at present employed for trucks. Several of the newer machines have heavy truck units as their gearsets. Whether or not this is wisest is a matter of opinion because while the truck is designed to operate chiefly on its highest speed, the tractor high speed is incidental; consequently a gearset can be designed which would give less complication and accomplish the desired results for the tractor. This will be gone into more in detail in a later issue.

The one big need in the tractor industry to-day seems to be that of standardization of dimensions and materials not essential to individuality in design, and it is to be assumed that the efforts of the Society of Automotive Engineers in this direction will bear fruit to the advantage of users, dealers and makers.

Education in Tractors Needed

FREMONT, Neb., Aug. 10—That manufacturers of tractors are not performing their full duty toward the tractor industry and toward the farmer, in that they are not educating him properly in handling tractors, was brought out most forcibly by the talks and comment at the dinner and meeting at which over 400 tractor manufacturers and tractor accessory men took part. It was held Wednesday evening in conjunction with the fifth annual demonstration of agricultural tractors, which has been in progress here this week and was a meeting of the tractor division of the Society of Automotive Engineers. Such men as A. P. Yerkes of the Bureau of Farm Management of the Department of Agriculture, President Dunham of the S. A. E., and Howard Coffin, chairman of the aircraft board, Council of National Defense, all made the point that the sales arguments of many of the tractor men that their particular tractors were fool-proof and required little or no attention or care, was doing very much to give the industry as a whole a black eye with the farmer.

Gurney exhibit of the largest ball-bearing in captivity. Much is made of the fact that the Ford tractor is Gurney-equipped

It was made plain that in the present state of the art, at least, no tractors are fool-proof, none can be operated successfully without intelligent and painstaking care, and none should be expected to be so. Lack of knowledge of the best methods of maintenance and handling of the tractor, and misleading statements as to its capabilities which causes the farmer to overload it and expect more than it can perform, is injuring the tractor as a farm implement.

Another point which was put forcibly before the tractor men, both by President Dunham and by Mr. Coffin, was the need of co-operation among the tractor makers to the end that the best type tractor, or best types of tractors, may be developed

(Concluded on page 18)

Car and Plane Closer

Willys-Overland Interests Control Curtiss—U. S. Enters Airplane Field

Navy's $1,000,000 Plant Marks Step in Industry's Progress

WASHINGTON, D. C., Aug. 10—Each week sees the importance of aviation increasing and also shows the greater hold the motor car industry is getting on the airplane industry. Each week it becomes more and more apparent that the motor car industry is practically absorbing the airplane industry.

One of the biggest steps in this absorption was completed yesterday when the Willys-Overland interests gained control of the Curtiss Aeroplane & Motors Co., this action having been expected for months, as some time ago John N. Willys was elected president of the Curtiss organization and the Willys-Overland company some time ago started the manufacture of Curtiss airplane engines in large quantities. The Curtiss company has its main factory in Buffalo and also has a factory in Hammondsport, N. Y., where a large number of its engines are manufactured.

The two companies, Willys-Overland and Curtiss, have been allied practically since the formation of the Curtiss company, January, 1916, and the two have the same officials and board of directors. All the stock in the airplane company is held in a voting trust. C. M. Keys of New York has resigned as one of the three voting trustees. J. E. Kepperley, vice-president of Willys-Overland, Inc., succeeds him.

To Make Own Planes

Increased activities of the government in airplane manufacture is shown by what looks like the actual entry of the government into the manufacture of planes for the navy. Josephus Daniels, Secretary of the Navy, has authorized the construction of a $1,000,000 airplane factory at the League Island Navy Yard, Philadelphia, Pa., and contracts have been placed for erecting the factory on the basis of having the buildings completed and beginning of manufacturing operations in less than 100 days. The capacity of the plant will be 1000 small planes per year, apparently for navy use and a force of 2000 men will be employed.

The plant is a result of the enormous expansion of the airplane industry now being undertaken in the United States, and it not only will increase the navy's facilities and enable it to supply a part at least of its own needs but will relieve the private plants of the experimental developments which they have undertaken heretofore and enable them to turn their whole attention to the maximum production of approved types.

A further Government activity will be the establishment of an airplane government school at Atlantic City, N. J. The school will be in conjunction with a plant to be built at Atlantic City for the manufacture of parts for hydro-airplanes for war service in France. The plant, it is expected, will be headquarters for repairs of all seaplanes on the eastern coast. It will be the official central establishment for the Coast Defense Flying Corps.

Still a further example of airplane progress is the possible financial assistance by the government to the Wright-Martin Aircraft Corp., which is manufacturing the Hispano-Suiza motors. It is proposed that the Government advance Wright-Martin $10,000,000 working capital to take care of necessary changes in increasing motor production from four to fifty motors per day.

NEW DIRECTORS FOR CURTISS

New York, Aug. 13—Several new directors are to be elected to the Curtiss Aeroplane & Motor Corp. board at the next meeting. It is stated that on the invitation of John N. Willys, Rodman Wanamaker of Philadelphia, and G. C. Taylor, president of the American Express Co., will be elected.

Both Mr. Wanamaker and Mr. Taylor have in the past been interested in aviation from the scientific side. Mr. Wanamaker was sponsor for a project to make an airplane voyage across the Atlantic, and the Curtiss plant at Hammondsport, N. Y., had constructed, at his order, a large flying boat for this purpose when the war compelled a postponement of the project.

LATE PRICE NEWS

New York, Aug. 11—Price readjustments are taking place in the industry each day to take care of the rise in material prices and wages. Though announcements have been made through these columns of prices each week several companies have made no mention of these changes and have only notified their dealers.

The following list is of various changes:

Car and model	Old price	New price
Apperson 6-17, two-pas.	$1,850	$1,990
Apperson 6-17, five-pas.	1,790	1,930
Apperson 6-17, seven-pas.	1,850	1,990
Apperson 8-17, two-pas.	2,000	2,250
Apperson 8-17, seven-pas.	2,000	2,250
Bour-Davis 18-A, five-pas.	1,250	1,385
Bour-Davis 18-B, five-pas.	1,600	1,785
Daniels, two-pas	2,800	3,100
Daniels, five-pas.	2,800	3,100
Daniels, seven-pas.	2,800	3,100
Franklin, two-pas.	1,900	2,000
Franklin, five-pas.	1,950	2,050
Franklin, coupe.	2,750	2,850
Franklin, sedan.	2,850	2,950
Franklin, limousine	3,100	3,200
Glide, five-pas.	1,295	1,395
Grant, two-pas.	875	950
Grant, five-pas.	875	950
Grant, coupe.	1,010	1,085
Grant, sedan.	1,050	1,125
Hollier 186-6, five-pas.	985	1,085
Hollier 178-8, two-pas.	1,185	1,285
Hollier 178-8, five-pas.	1,185	1,285
Paterson, two-pas.	1,195	1,295
Paterson, five-pas.	1,165	1,295
Paterson, seven-pas.	1,195	1,295
Pilot, two-pas.	1,200	1,295
Pilot, five-pas.	1,200	1,295
Stearns SKL4, two-pas.	1,495	1,585
Stearns SKL4, five-pas.	1,495	1,725
Stearns SKL4, coupe.	2,050	2,150
Stearns SKL4, limousine	2,900	3,000
Stearns SK8, two-pas.	2,250	2,375
Stearns SK8, seven-pas.	2,250	2,375
Stearns SK8, coupe.	2,900	3,075
Stearns SK8, limousine	3,500	3,785
Studebaker:		
SF-4-40, two-pas.	985	1,050
SF-4-40, seven-pas.	985	1,050
SF-4-40, Det. top	1,185	1,250
ED-6-50, two-pas.	1,250	1,335
ED-6-50, seven-pas.	1,250	1,385
ED-6-50, coupe	1,750	1,850
ED-6-50, sedan	1,700	1,850
ED-6-50, limousine	2,600	2,750
ED-6-50, Det. top	1,450	1,565

Lake War Road Urged

Three Hundred Good Roads Workers Launch Plan for Motor Highway

Would Connect Chicago and Two Army and Navy Posts

CHICAGO, Aug. 13—Need of adequate arteries for motor transportation of supplies to naval and military training stations, and the folly of placing entire dependence upon railroads for the transportation of these supplies from manufacturing and distributing centers, was emphasized by military and naval authorities Saturday. Col. W. J. Nicholson, commanding officer at Fort Sheridan, and Lieutenant Commander Grimes, U. S. N., representing Capt. William A. Moffatt, Commandant Great Lake Naval Training Station, both urged the military necessity of immediate provision of a motor road usable all the year round connecting the naval training station and the military training station at Fort Sheridan with Chicago. Of such immediate necessity is this road that authorities of the naval and military stations arranged a dinner at the naval training station to 300 good roads enthusiasts of Chicago and the North Shore municipalities in order that they might be aroused to get the construction under way.

Dinner Launches Plan

As a result, a plan was made for a military highway to run between Waukegan and Chicago, a distance of 41 miles, and to cost $1,500,000. The meeting was under the chairmanship of William G. Edens, president of the Touring Club of America, and the National Parks Highway Association, the Illinois Highways Association, the Associated Good Roads Organization of Chicago and Cook County and other good roads organizations. So important was the work considered that Congressmen George Edmund Foss made a special trip from Washington to urge action on the roads, as did representatives of the state highway department and the Bureau of Public Roads of the Department of Agriculture. Samuel Insull, chairman of the Illinois State Council of Defense, urged haste as a matter of public safety.

It is not proposed to develop this military highway from any of the present arteries of travel but to construct this at a sufficient distance from thickly settled centers to avoid too heavy traffic. A committee composed of such men as Samuel Insull, J. Ogden Armour, Louis F. Swift, James A. Patten and others was appointed to bring about the building of the road.

The stations are on the lake shore, Fort Sheridan being 29 miles from Chicago and the Great Lakes Naval Training Station 6 miles beyond. There will be in the neighborhood of 25,000 men at the two stations within a short time.

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220 MILES IN 10 HR.

Louisville, Ky., Aug. 11—In the transcontinental relay trip being conducted to ascertain the degree of efficiency with

which motor cars could do courier service in the event of telegraph or rail communication being disabled, Louisville motorists Wednesday carried the dispatches from Mount Sterling, Ky., to Vincennes, Ind. The start was made at Washington at 7 o'clock Tuesday morning, when dispatches addressed to the commanding officer of the Presidio at San Francisco were handed to the first motorist by Secretary of War Baker. The route taken for the trip is over the National Midland Trail, which passes through Louisville.

The total run through Kentucky was 220 miles and the official estimate was placed at 10 hr. The distance was covered in 9 hr. and 27 min.

STOUT IN AVIATION SERVICE

Detroit, Aug. 10—William B. Stout has given up his duties as manager of the aircraft division of the Packard Motor Car Co. to go into aircraft work for the Government in Washington, D. C.

TO RECRUIT FROM MOTOR CLUB

Chicago, Aug. 13—Effort is being made to recruit a company from the membership of the Chicago Motor Club to be attached to the Eleventh Illinois National Guard regiment. This will be a local body to take the place of the Illinois National Guard now mustered into federal service and will be for state service only. The regiment of which the proposed company will be a part will be under the command of General James E. Stuart.

PURCHASE AUTO-LITE NOTES

Cleveland, Ohio, Aug. 13—The National City Co. has purchased $5,000,000 6 per cent secured gold notes of the Electric Auto-Light Corp. Of the issue $2,000,000 mature in one year, $3,000,000 in two years. The former will be offered at 99¼ and interest to yield over 6¾ per cent, and the latter at 98 per cent and interest to yield over 7 per cent. The notes will be secured by collateral valued at over $17,000,000 and consisting of common stock of the Willys-Overland Co., Fisk Rubber Co., 7 per cent secured preferred stock, and Federal Rubber Co. 7 per cent second preferred stock. The company was recently organized to acquire the assets of a corporation of similar name in Toledo.

OIL HIGHEST IN 20 YEARS

Pittsburgh, Pa., Aug. 14—The price of Pennsylvania crude oil reached the highest point today in more than 20 years, South Pennsylvania making an abrupt change upward of 15 cents a barrel, which brings the present cost of that grade of crude in that territory to $3.25 per barrel. Several other grades also advanced from 5 to 15 cents per barrel. Officials of oil companies predict this will mean the probable rise of 1 cent per gallon in the tank wagon cost of gasoline and 4 or 5 cents per gallon in the cost of lubricating oil. The tank wagon price of gasoline in the East has been 26 cents for some time, or 6 cents higher than the price in Standard Oil territory in the central states. The present phenomenal rise in the price of crude is said to be due primarily to an increase in demand and a decrease in production.

Oldfield Breaks Records

Betters Times for 10 and 15 Miles Set by Late Bob Burman

Drive Against Time Lowers Ten Dirt Track Marks

ST. LOUIS, Mo., Aug. 11—World's dirt track records fell here to-day before Barney Oldfield's specially built Miller-engined car in which he has competed frequently this summer with Ralph de Palma, driving the Packard with a twelve-cylinder aviation engine. Oldfield, with winning both the 10 and 15 mile events, bettered previous records set by Bob Burman at Bakersfield, Cal., in 1915, Barney's time for the ten miles being 7:58.8 or 76.6 m.p.h. The best previous mark over a 1-mile dirt track was 8:06. Oldfield took the 15-mile race at a speed of 74.5 m.p.h., his time being 12:04 in which he bettered Burman's record by 19 sec.

Oldfield failed to better his 1-mile dirt track record made with the Christie at Bakersfield, Cal., in 1913, his time to-day being 47 sec. flat, while the previous record he held was 46.4. His time at 5 miles was 4 min. flat, whereas Burman's mark was 4:02.

Unannounced to the public Oldfield drove against time Thursday afternoon and broke all records for 1, 2, 3, 4, 5, 10, 15, 20, 25, and 50 miles on a dirt track. The time recorded by an electric timer in charge of Chester R. Ricker, together with the previous records for these distances follow:

Miles	Time Speed	Record Speed	M.P.H. Speed	Previous Speed
1.....	:45.0	:46.2	80.0	77.9
2.....	1:30.4	1:32.6	79.6	77.7
3.....	2:17.6	2:27.8	78.6	73.0
4.....	3:05.6	3:17.4	77.6	73.0
5.....	3:53.6	4:06.6	76.9	73.0
10.....	7:56.2	8:16.4	75.6	72.6
15.....	12:00.8	12:23.2	75.0	72.7
20.....	15:52.2	16:25.6	75.6	73.2
25.....	19:57.6	20:28.8	75.2	73.3
50.....	40:47.6	40:57.8	73.6	73.3

TACOMA PLANS RACES

Tacoma, Wash., Aug. 10—The Tacoma Speedway Association will hold a race meet Labor Day. It has been decided to hold three short races instead of the long grind as at previous meets. One race will be for a distance of 100 miles, another for 50 and the third will be a stunt race.

PIKE'S PEAK CLIMB OFF

Colorado Springs, Col., Aug. 11—The Pike's Peak hillclimb, which was scheduled to be run Sept 8, has been called off, officials announcing that motor car manufacturers and drivers are engaged in war work and are unable to participate in the meet. No more hillclimbs will be run up Colorado's famous peak during the period of the war.

CHICAGO RACE SEPT. 22

Chicago, Aug. 13—Three races, 20, 50 and 100 miles respectively will make up the program at the Chicago speedway, Sept. 22, according to plans now being made by local speedway officials. Following the Chicago race last June a movement was started for a relay race to be run some time this month, but this has been abandoned, and in its place the three races mentioned above are scheduled. An effort was made to secure Sept. 15 for this meet, but as Providence, R. I., has a race scheduled for that date, it has been decided to run the Chicago races a week later, at the time of the accessory show for Fords, when a large number of motorists from out of town are expected to be in the city. Present plans are tentative only, and definite details as to purses and entries will not be known for another week at least.

NEW AVIATION ENGINE

Cleveland, Ohio, Aug. 13—Charles J. Wreger of this city, a well known motor car engineer, has invented a new aviation engine and is forming a company for its production.

TO SETTLE AIRPLANE PATENTS

Dayton, Ohio, Aug. 13—The Manufacturers' Aircraft Association has been organized by the Wright-Martin Co. and nine other airplane makers to settle all questions regarding airplane patents and to act as a clearing house. It is open to all bona fide manufacturers.

AUSTRALIA LIMITS IMPORTS

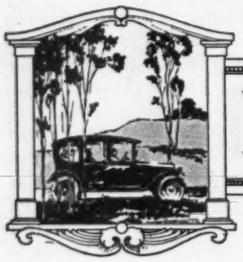
Sydney, Australia, Aug. 13—Special cable—The Luxury Board has at last announced its plans in regard to motor car importation. Under its decree the importation of complete motor vehicles is prohibited, although manufacturers may continue to ship chassis without bodies into Australia. All complete motor vehicles now in transit between the factories of this country can enter Australia, being excepted in the ruling which applies only to shipments made after this date.

DE PALMA OFFERED PRIZE

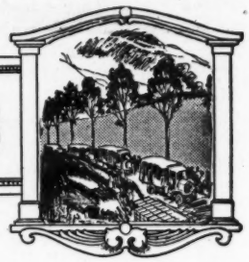
New York, Aug. 11—Harry Harkness, owner of the Sheepshead Bay Speedway, has put up $1,000 as a special prize for de Palma if he lowers the world's records for 1 and 2 miles at the course Aug. 18. Oldfield, Chevrolet and de Palma will meet in a special match race. Oldfield will drive his Golden Egg, de Palma will drive the Packard special, and Chevrolet the Frontenac. Three heats will be run, one at 50 miles, another at 30 miles and another at 20.

CHANDLER OUT OF RACING

Chicago, Aug. 14—Billy Chandler, whom the Cincinnati speedway has been banking on as one of three drivers in case Chandler, Patterson and Vail took over the Super-sixes and drove them in their own names, the Hudson company having withdrawn from racing, is out of the racing game temporarily at least. He has become an inspector of engines in the Curtiss airplane plant at Buffalo, N. Y., and will work under E. V. Rippengill of the Hudson Motor Car Co., now chief inspector for Curtiss.



EDITORIAL PERSPECTIVES



Military Motor Roads

CHICAGO has started a movement for military motor roads in connection with the army and navy cantonments that points to great possibilities by way of conserving railroad freight cars, fortifying the cantonments against possible food shortages and stimulating the military road movement as well. The idea started with building a special military truck road from Chicago north along the west shore of Lake Michigan to Fort Sheridan, the big army post, and about 10 miles farther north to Lake Bluff, the Naval training station of the great lakes. Both places are today served by one railroad line and one trolley system. In addition the city streets can be used for transportation of goods by trucks. The movement to build a special motor truck road so that both of these posts would be entirely independent of the railroad and trolley service is not only a commendable economic suggestion but an excellent safety precaution.

IT is to be hoped that Federal aid can be secured for such a road, although at present the law requires that all Federal appropriations be spent on postroads. Such legislation should be changed immediately, in these days when military highways for motor apparatus should take first place in national importance. These are years when military roads are growing daily in importance, and although we have not actually entered upon the construction of a system of military highways, it is only rational precaution to start building highways to these great cantonments scattered all over the country and which will be of primary importance for the next four or five years, if not for the next generation.

IT is possible and highly probable that many of our soldiers when they reach France will be engaged in road building. Why not start them in this work?

The Farm Tractor

IT has been known for years that motor tractors will plow and perform the dozen other jobs needed on the farm, but the demonstrations held in Fremont, Neb., last week proved conclusively that the tractor must be better displayed and better demonstrated and better advertised, if the great public is to be adequately advised of its merits and its weaknesses.

THE farm tractor is far from being as perfected a piece of machinery as is the motor car, the motor truck or the airplane. The tractor has not been in the limelight enough. It has not been called upon to show its strength, to prove all of its claims, to establish itself. The demonstrations showed that tractors would plow but that was about all they did. The tractors did about one real day's plowing and used three days to do it. The rules of the demonstration should be such as to compel the tractors to start at 7 in the morning and plow until 7 or later at night. That is what the farmer is looking for, and why not give him an argument? It seems the last sentence in folly to start tractors plowing at noon and let them do just about as much as they wanted to. There was not a tractor in Fremont that was pushed as it should have been pushed. Each tractor kept within its limits of endurance. The weak tractor did just what it could do and not show its weaknesses. The strong tractor did not have a chance of demonstrating that it can plow from the rising of the sun to the setting thereof without giving a symptom of trouble.

THANKS to the Society of Automotive Engineers holding two or three meetings at Fremont it was possible to get a line on what tractors are doing with burning kerosene instead of gasoline. At the demonstrations fully two-thirds of the tractors carried signs showing that they were burning kerosene. In the field the farmer took the keenest interest in seeing the cloud of bluish smoke coming from the machine. That meant to him the machines were burning kerosene. If he had not seen the smoke he would not have believed they were burning kerosene. That suggests what a student of fuel economy and engine efficiency the average farmer is. The smoke which he looked upon as proof of burning kerosene was the worst advertisement kerosene could have received and was the convincing proof that there is not a tractor burning kerosene successfully and efficiently today. This fuel question is one of the unfortunate situations in the tractor field. While two-thirds burned kerosene, they did it so poorly and so wastefully that it would have been more efficient to have burned gasoline. One of the engineers at the S. A. E. meeting made the unqualified statement that not a single tractor is handling kerosene properly.

THEN why burn kerosene if it cannot be efficiently burned? The answer rests with the farmer. He invariably asks if it will burn kerosene. He imagines that some day he may not be able to buy gasoline and then he wants a machine that will burn kerosene. There is a moiety of fact in this, but it is no reason why two-thirds of the tractors should make poor and inefficient demonstrations. The truth about kerosene is that it cannot be used efficiently in an engine that was designed to burn gasoline. Kerosene can be burned in such an engine but not efficiently. Some of the best engine makers have been preaching this doctrine but the tractor makers in not a few cases did not want to hear it. They rather wanted to sell their machines on the kerosene argument and let efficiency and cost of maintenance take care of themselves. Burning kerosene at Fremont last week meant burning of lubricating oil. It meant loss of flexibility.

TO DAY fuel conservation is a world-wide problem. It is very desirable that the best use be made of all fuels. It is highly desirable that kerosene be used to save the gasoline supplies, but we should face the facts with kerosene. If it is impossible to use kerosene by adding a kerosene carbureter and special manifolds to an engine designed to use gasoline, then the world should know it and engine makers should shoulder the kerosene problem, as it rests on them.

TIME will be required to evolve the solution. In the meantime let the truth be known. Kerosene is not being efficiently used in farm tractors. It is being expensively used. Fortunately the farmer is not using kerosene nearly so extensively as many tractor makers would have you believe. He has found out how kerosene is needlessly expensive on cylinder oil, how engines get gummed up, how bearings get abused and how other difficulties arise. He demands a kerosene-burning job and then uses gasoline.

Wings for Our War Eagles

ALL world's records for industrial development of a new art must be broken if we are to build in a year a billion-dollar industry to insure victory in the clouds by producing thousands of battleplanes and trained fighters to operate them. This statement was made by Captain Earl Hamilton Smith, O. R. C., secretary of the National Aerial Coast Patrol Commission, in The Nation's Business. The whole task is one of industrial organization for quantity production, and in this we Americans, above all others, are fitted by experience and tradition to break world's records.

FIVE big feats, which never have been accomplished before by any nation, must be performed by American industries to win the war in the air—to blind Germany, as the expression has come to be known. Here, concretely, is what must be done:

First: Successfully develop a new billion-dollar industry within a year and be prepared to keep it going indefinitely;

Second: Lay the foundation in one year of a mammoth aircraft production which will equal what France and Great Britain have taken three years to do;

Third: Attain quality as well as quantity production of machinery of exceedingly delicate airplane engines, equal to those now being made only by the most skillful hand labor in France, Great Britain and Italy;

Fourth: Furnish 75,000,000 ft. of airplane spruce by a kiln dried process equal to air-dried spruce, which never has been done before;

Fifth: Do all this without seriously dislocating normal business, or interfering to any serious degree with any other phase of vital war activity.

Leaders of American business, already bearing the strain of enormous war tasks, declare emphatically that they can do all this. Brigadier General George O. Squier, chief signal officer of the army, says without hesitation: "Young America will fly and win for freedom." The serene confidence of Howard E. Coffin, chairman of the Aircraft Production Board of the Council of National Defense, is appalling. He declares: "The whole project is one worthy of America's capacity and energy." Then he calmly sits back and keeps on with the work of making this come true!

After all, it is the spirit that counts. Battles and wars are won not merely by billions of dollars and millions of men. Back of this must be what Napoleon used to call "the imponderables," meaning the indefinable qualitites such as faith and courage and exaltation of purpose. These attributes abound in the aeronautical crusade, as much outside the government as in it, and the creed of the business men of this country who are banding together to perform five hitherto impossible feats within a year was set forth recently by the Aircraft Production board in the terse statement that "all world's records for industrial development of a new art must be broken.....and Americans are fitted by experience and tradition to break world's records."

The government's aeronautical program calls for the rushed construction of 22,000 airplanes, school machines and battleplanes and 49,000 airplane engines. It also requires the creation of a specially-trained personnel of over 100,000 officers and men, of whom 10,000 are to be fliers. This last is a task for the War department and the Signal Corps and we may be assured that this will keep pace with the expected achievements of the industrial side of the project which involves the honor and safety of our country.

The air program will be a billion-dollar proposition within a year for the reason that the money already appropriated will not be enough. As the result of carefully laid plans the United States will be turning out 3,000 airplanes a month by a year from now, which means we should have 30,000 in the war zone when the 1919 campaign begins, if the war should last that long. This will mean the expenditure of another billion in addition to the first. France and Great Britain after three years of war, have not turned out more than 40,000 machines of all kinds, and they now have on hand, according to reports, about 20,000, including school machines, both slow and fast, as well as fighting planes, patrol scouts and heavy bombers. France and Great Britian combined have just begun to hope for a quantity production equal to the 30,000 machines per year which we are expected to begin to attain within one year.

It is believed that our air program will be carried out with a minimum of business dislocation and interference with other war work. It may affect the passenger car business, but the truck industry very likely will not be disturbed. Cylinders are to be turned out by the present munition plants and the General Munitions Board has officially declared that it can be done and is expected to be done without reducing the outputs of munitions by so much as a single shell.

Cash register, sewing machines and typewriter companies are to turn out small metal parts. This also is to be accomplished, according to the Aircraft Production Board's estimate, based on statistical reports from all the leading companies in these lines, without interfering with the greatly augmented production of typewriters, sewing machines and cash registers, which are imperative for war purposes.

Furniture factories and wood working companies of all kinds will fashion propellers, for which nearly 3,000,000 ft. of mahogany and black walnut will be needed. Great Britain most likely will continue to furnish the linen at the rate of 175 sq. yd. per airplane, or 3,850,000 yds. for the entire 22,000 American planes

(Concluded on page 27)

Motors Come to Kansas City's Rescue

Strike on Street Railways Brings Out Home Guard of Owners in Force

KANSAS CITY, Mo., Aug. 11—It has kept the 13,000 motor cars in Kansas City busy this week transporting the 500,000 or more passengers the street railways usually transport, for the street car employees went on a strike Wednesday and are still out. Kansas City, including the small towns just around it, has about 400,000 inhabitants. The cars serve the community with about 800 cars, 1700 motormen and conductors and universal transfers and daily traffic of about 500,000 on normal days. This means that perhaps 400,000 persons are in the habit of riding 600,000 times, and 13,000 motor cars, with the reinforcement of motor trucks, had to furnish means for "business as usual."

Thousands walked. Several thousand owners of private cars carried friends—or strangers—without charge. Every business house that had a truck fitted it for bringing employees to work and taking them home. Owners of liability insurance were as a rule careful not to accept payment for transporting passengers. Many drivers who carried passengers free said they were thus assisting strikes; others were merely good-natured.

The first two days charges for rides were irregular and often extortionate. Drivers charged what they could get. Later, most of them got down to a 10-cent basis for the normal haul.

Remarkably few accidents were reported during the strike, despite congestion of traffic and the speed at which the motor cars ran. Very few buses like those in jitney service two years ago were seen on the streets.

WILLYS-OVERLAND AMBULANCE

Toledo, Ohio, Aug. 10—The Willys-Overland, Inc., has placed on the market a special Red Cross ambulance completely equipped for $1,250, f. o. b. Toledo. The ambulance body is of the regulation French army and Red Cross type. The body has a frame of selected ash. The sides are weather proof and light. Brass and nickel screws are used instead of nails. The top is of 10-oz. regulation duck over poplar slats. A 16-gal. water tank is carried on one running board; a large emergency box on the other. Three regulation army litters with blankets are added to the regular equipment. The body is made collapsible to facilitate overseas shipping. A brass plate 2 ft. long on which the names of the donors can be inscribed is attached. The Willys-Overland, Inc., points out the advantages of the use of its ambulances in the great number of cars already in use in France, which insures a large force of skilled mechanics who will be able to give service on Willys-Overland ambulances. The company also maintains large stocks of parts at London and Paris.

EVERITT TAKES CHARGE

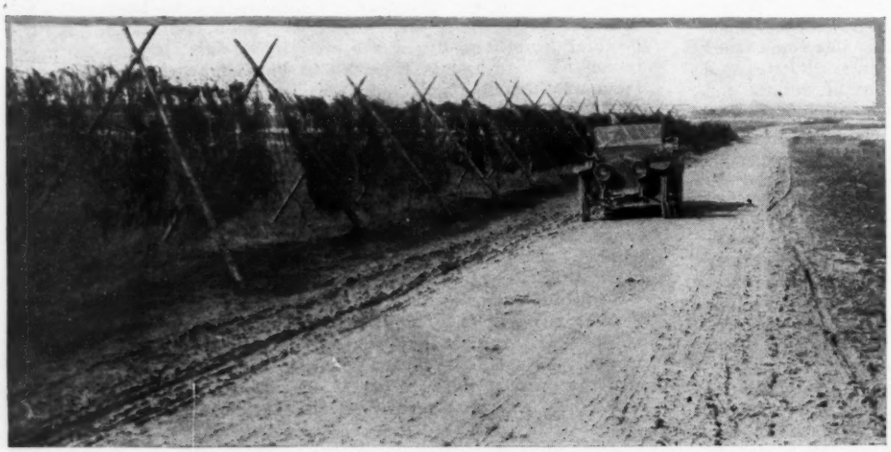
Detroit, Aug. 7—Following an unsuccessful effort of creditors and directors to complete financing affairs of the Springfield Body Co., three creditors of the company filed a petition in the United States District court at Detroit asking for appointment of a receiver. B. F. Everitt was appointed temporary receiver. It is stated by the temporary receiver that the company has assets of $1,400,000 and liabilities of $700,000. It is expected that under the receivership the company will be able to secure the supplies necessary to fill the many orders it has on hand.

TO MAKE KUHN TRACTOR

Spokane, Wash., Aug. 10—The Kuhn Tractor Truck Co., recently organized in Seattle, has commenced operations. An assembling plant will be established in Spokane to handle the business east of the mountains.

The Kuhn tractor has several new features. Among these are a compound steering device, which affords independent front and rear steering control, by which the back end of a truck may be guided against a curb in the same manner and ease that the front end is so guided; a backing device for differential gears to prevent wheel spinning; an improvement in gear transmission to avoid any possibility of gear-stripping; a brake mechanism, applying to front and rear wheels and adjustable.

Officers of the company are William O. Kuhn, president; Gus Ehrenberg, vice-president and general manager; Theodore Gentsch, secretary and treasurer; Judge Wilson R. Gay, general counsel.



Fooling the enemy—camouflage. This road, which is of strategic value, is screened against the artillery observers so that looking through the trench periscope they will see no cars but a row of trees or a small forest

FEW CAR FACTORY EXEMPTIONS

Detroit, Aug. 13—As was predicted in a recent issue of MOTOR AGE, motor car makers will ask for very few industrial exemptions for their employees. It has been found that the number of men of draft age who have been called is less than 3 per cent of the total number of workers employed in the various factories. The Ford Motor Co., for example, has 1,200 workers immediately liable for draft out of an organization of 42,000. The Chalmers Motor Co. has 127 workers out of 2,000 employees immediately liable for draft, of whom forty-nine have no dependents or other exemption claims. These figures show the relatively small proportion of men who will be taken from the industry. At the Packard plant it is stated that exemption will be asked for as many workers as the company can hold, owing to the vast Government truck business in which the company is now engaged and which requires all of its resources. The Detroit Board of Commerce is urging all manufacturers to forego industrial exemptions to the greatest possible extent.

NEW ¾-TON REPUBLIC TRUCK

Alma, Mich., Aug. 13—The Republic Motor Truck Co. has a new ¾-ton truck which will sell for $895. The model is now being built and will be ready for delivery in September.

TO END DODGE-FORD SUIT

Detroit, Aug. 10—Decision in the Dodge-Ford suit, which is concerned with the objections of the Dodge brothers to Henry Ford's withholding dividends for expansion purposes and for the erection of the smelting plant at the River Rouge, is expected Oct. 1.

FERGUSON NOW WITH C. J. CO.

New York, Aug. 13—C. O. Ferguson, formerly with the Advance Felt Specialty & Cutting Co., has been made circulation manager of the Class Journal Co., which publishes MOTOR AGE, *Motor World* and the *Automobile and Automotive Industries*. Before his connection with the Advance Felt, Ferguson was circulation manager of MOTOR AGE.

STANWAL BRAKE LINING TESTED

Walpole, Mass., Aug. 6—Under the direction of two engineers a test of 501.1 miles was made July 27, 28 of Stanwal brake lining on a route to and from the White Mountains with Walpole, Mass., as a starting point. The material tested was $\frac{3}{16}$-in. by 2½-in. lining taken from stock at the factory of the Standard Woven Fabric Co. The product was applied to the service brake bands of a 1914 Cadillac roadster.

With the exception of ½ mile the 8-mile descent of the mountain was made with the car's momentum under complete control of the foot brake, the gearshift being in neutral and the emergency brake released. The weight of the car, including three passengers, was 4670 lb. The brake drum was 16 in. The time of the 8-mile descent was 1 hr. 50 min., and the approximate rate of descent 6 m.p.h. The lining showed an average loss of weight for the entire trip to and from Walpole of 22.5 per cent. Temperatures were measured by a thermo-electric pyrometer with a very sensitive mill-voltmeter. The temperatures for the right lining at the end of the first mile down the mountain were 180 deg. F. and for the left lining 252 deg. At the last mile down the mountain the right lining was 484 deg. and the left 482.

THREE COMPANIES DROP MODELS

New York, Aug. 11—As a possible step toward economy, the Nash Motors Co. has dropped the manufacture of its four-cylinder model. The Lexington-Howard Co. has dropped its 6-P model, made up as a seven-passenger touring and selling at $2,875. The Regal Motor Car Co. has dropped the Model F eight selling at $1,200 and built as a two-passenger roadster.

STANDARD PARTS EARNINGS

Cleveland, Ohio, Aug. 6—Net earnings of the Standard Parts Co. in June amounted to $360,359.39. For the first six months of the company's operations, the period ended June 30 last, net earnings were $1,994,793.02, or at the annual rate of about 30 per cent on common stock. These figures are after liberal depreciation charges but before deductions for excess profits taxes.

The company, as stated in a recent issue of MOTOR AGE, has an opportunity to acquire the plant of the American Ball Bearing Co., which has equipment especially adapted for the manufacture of heavy axles, demand for which has been created by the war. The opportunity to acquire the plant is based on an exchange on the basis of asset values of American Ball Bearing common stock for Standard Parts common stock. Directors of the Standard Parts Co. have recommended the purchase.

LAW BRINGS CONFUSION

Los Angeles, Cal., Aug. 10—Several provisions of the new state motor vehicle law are now operative. Those pertaining to the use of headlights and spotlights are the most drastic and have become the cause for extensive confusion. The law stipulates that no ray of light from the headlights shall rise more than 42 in. from the ground at a distance of 75 ft. in front of the car. The same applies to spotlights and, in addition, these shall be immovable up or down from the driver's seat.

There are more than 40,000 motor vehicles in Los Angeles. Owners have known about the new law for three months, but practically none gave heed. For four nights of the current week every garage in the city has been working at full speed to adjust car lamps, but it is estimated not more than a tenth now comply with the requirements. The police require a certificate of inspection. Violation of the law is punishable by a heavy fine.

Suggestions as to Your Gasoline Bit!

How You Can Avoid Laying Up Cars in War Crisis by Economy of Fuel

1—Do not allow your gasoline engine to run idle.

2—Use kerosene, not gasoline, for cleaning purposes in the garage.

3—See to it that the carbureter does not leak. Form the habit of shutting off the gasoline at the tank.

WASHINGTON, D. C., Aug. 10—Coincident with the expansion of the Army's program for the use of airplanes, trucks and so on, Van H. Manning, director of the Bureau of Mines of the Department of the Interior, has issued the above suggestions to motorists, which in view of action taken by foreign countries toward motoring, and previous discussion of the gasoline situation in this country, well might be heeded carefully.

It is estimated that the United States army will need 350,000,000 gal. of gasoline for airplanes, trucks, tractors and other machines. To obtain a part at least of this amount it has been suggested that the man who rides for pleasure should cut down his mileage, since half the gasoline used in this country, 1,250,000,000 gal., is used in pleasure riding. By economical use enough gasoline can be saved to supply not only the United States but its allies for war purposes.

Motor car owners are not advised to lay up their cars but to use them either for trade or pleasure purposes thoughtfully and judiciously. If this advice is followed, there will be no undue scarcity, says Mr. Manning, for the United States possesses an abundant supply for ordinary purposes.

NINE MORE ENGINEERS CALLED

Washington, D. C., Aug. 11—Nine more engineers are aiding the government to complete the design of standard military trucks. These are in addition to the list given in MOTOR AGE last week and are: Carl Clement, Bock Bearing Co., Toledo, Ohio; William W. Peck, Muncie Gear Works, Muncie, Ind.; J. D. Harris, McCord Mfg. Co., Detroit; Alvina Gloetzner, Covert Gear Co., Detroit; G. C. Hart, Brown-Lipe Gear Co., Syracuse, N. Y.; A. W. Copland, Detroit Gear & Machine Co., Detroit; S. O. White, Warner Gear Co., Muncie, Ind.; K. W. Hooth, Fuller & Sons Mfg. Co., Kalamazoo, Mich.; George Hotz, Hotz Brothers' Foundry Co., Fremont, Ohio.

TO TRAIN TRACTOR DRIVERS

Peoria, Ill., Aug. 11—Capt. H. D. Herring of the United States army arrived in Peoria this week to arrange for the establishment of a tractor-driving training camp in East Peoria, adjacent to the plant of the Holt Caterpillar Co. Officers and men who are to handle the war tractors in France will be given instruction in handling the machines prior to service abroad. A tract of 5 acres was selected for the camp and fifty officers and 300 enlisted men will be on duty during the period thought necessary for the instruction. Captain Herring formerly was adjutant general for the state of New Mexico and recently was commissioned by the War Department to act as one of the chiefs in the new tractor service.

TEXAS EXPECTS MORE GASOLINE

Austin, Tex., Aug. 11—As a result of an enormous increase of crude oil production in Texas, the threatened shortage of the gasoline supply in the state may not occur. Refineries are preparing to avail themselves of the increased yield of oil and besides the existing plants which will now be operated to their full capacity, two or three new refineries may be erected.

What is said to be the largest oil-producing well brought in in the Gulf Coast fields of Texas since the exciting days that

Army motor trucks are helping build the cantonments for our national army. They carry the materials to the site and aid in other ways. More than 35,000 men will be housed in the camp at which these trucks are working

attended the first strikes on Spindletop in the early history of the industry in Texas, is flowing at the rate of about 40,000 bbl. a day at Goose Creek. The producing strata was encountered at a depth of 3180 ft., which is below that of any other well yet bored in the comparatively new field. It is one of the most important developments that has taken place in the oil fields of Texas for several years, as it may mean the coming back of the oil production of this state to what it was in former times.

Since Aug. 1 there has been added to the daily production of the Gulf coast fields approximately 107,000 bbl. of oil, which breaks all records since the decline of the yield began about two years ago. The new production since Aug. 1 in the Goose Creek district alone amounts to about 70,000 bbl. The Texas Exploration Co. brought in a gusher a few days ago at Damon Mound that has a flow of about 10,000 bbl. a day. Several other producing wells have been successfully finished in that field during the past several days.

The larger oil operators are getting possession of all the land they can either by lease or by purchase not only in the Goose Creek and Damon Mound field but in other localities where prospects for obtaining oil are regarded as favorable and an unusual amount of development will soon be inaugurated.

The recent heavy increase in oil production is causing a heavy demand for casing for the wells and for pipe for the transportation lines. There is such a scarcity of these necessary materials that development operations are not as extensive as they otherwise would be.

FREE PROTECTION FOR CARS

Chicago, Aug. 14—Facilities for checking motorists' cars in Grant Park are offered now by the Chicago Motor Club, which, after long months of persuasion, has succeeded in getting the sanction of the South Park Board, which controls Grant Park, to operate a checking service for all motorists who care to avail themselves of the privilege.

The service was begun last Saturday and during that day forty cars were parked under the plan which gives the car owner a check for his machine and without which he cannot take his car out of the parking space. Yesterday approximately eighty cars were checked during the day, the hours during which this service is given being from 7 a. m. to 9 p. m. There is no charge and motorists are urged not to tip those who have charge of the checking. A motorist who is not a member of the Chicago Motor Club is as welcome to the service as are members.

At present 3500 sq. ft. of space are given over to this use. More space will be given to this use as soon as demand makes it necessary. At present no signs indicate that such a checking system is in force, but appropriate signs will be put up in the near future.

OLDS PROPERTY FOR CAMP

Tampa, Fla., Aug. 13—R. E. Olds, president of the Reo Motor Car Co., has offered his Oldsmar property in Florida to the government for three years without charge for an aviation camp.

Milwaukee Trade Boosts

Fall Motor Show Tour Has Thirty-Four Entries by Distributors

Governor of State Will Help Make the Trip Successful

MILWAUKEE, Wis., Aug. 11—Thirty-four Milwaukee distributers already have entered a car each in the second annual Wisconsin State Fair Booster tour to be conducted over an 830-mile route Aug. 20 to 25, by the Milwaukee Automobile Dealers', Inc. Between twelve and fourteen additional entries are expected. In addition, there will be five cars to carry a full brass band and three tire and service cars, making a total of fifty-four or fifty-five cars in the motorcade to tell Wisconsin about the fall show which the M. A. D. will stage with the agricultural exposition at State Fair park, West Allis.

Gov. E. L. Philipp of Wisconsin has consented to accompany the tourists for at least part of the route, and Mayor Daniel W. Hoan of Milwaukee has arranged to be on hand from start to finish. C. P. Norgord, commissioner of agriculture, and Francis A. Cannon, executive secretary of the Wisconsin Good Roads Association, also will be guests.

The 200-odd participants in the tour will wear Norfolk suits of olive drab cloth, with a brassard inscribed, "1917 State Fair Boosters." The entire party will be instructed in military formations by army officers, four drills having been arranged between now and tour time.

HAS $336,676.72 NET IMPROVEMENT

Niagara Falls, N. Y., Aug. 13—The stockholders' meeting of the U. S. Light & Heat Corp., held Aug. 8 at the factory, revealed an extraordinary gain in profits. J. Allen Smith, president, submitted the annual report, which showed that although the company had operated at a loss for several years prior to the fiscal year just ended, the closing of the books for the last year displayed a profit. The extent of the improvement was shown by the fact that losses for the year ended June 30, 1916, amounted to $331,792.42 and the losses continued through the first eight months of this year, but the profits of the last four months absorbed all the losses of the earlier months and have allowed a net profit of $4,884.30 for the year, which is a net improvement of $336,676.72 over the previous year.

The company's volume of business shows an increase of 72 per cent. New manufacturing systems and other economies are being made rapidly.

GOODYEAR PLANT IN BRAZIL

Rio de Janeiro, Brazil, Aug. 10—The Goodyear Tire & Rubber Co. of South America has bought 13 acres near this city and will build a rubber factory there. The plant is to make articles enumerated in the company's contract with the government, which includes rubber goods, copper wire for insulating canvas and other cotton fabrics for use in making tires and other products. The plant will be in operation within fifteen months after the plans are approved.

HASSLER MOTOR TO DISSOLVE

Indianapolis, Ind., Aug. 13—The Hassler Motor Co. has filed preliminary certificate of dissolution with the secretary of state and within a few weeks will be dissolved as a corporation. The company was organized early in the year with ample financial backing and was prepared to place on the market a medium-priced car of attractive design. Robert H. Hassler of the Hassler Shock Absorber Co., was the head of the motor company. Several cars were manufactured and were exhibited at motor shows in Chicago and other cities, but officers of the company decided that the time is not opportune at the present to place a new car on the market and it was decided to drop the venture. The company had made no extensive investments in equipment.

FORD PLANT VALUE RAISED

Detroit, Aug. 13—The state board of review in Highland Park has raised the value of the Ford plant $35,000,000 above the township board rating. The township board rated the plant at $42,500,000 and the state board raised it to $77.500,000. The board also raised the township board's valuation of the Dodge plant from $7,500,000 to $13,000,000.

WARNING

A party signing himself Al. Gustin, as well as G. Owen, a professional subscription swindler, has recently been operating in Ohio and posing as a MOTOR AGE representative.

In some instances, he has offered MOTOR AGE for less than its regular subscription price of $3 and invariably offers prospective subscribers a premium in the form of a book with each subscription, notwithstanding the fact that MOTOR AGE never offers premiums of any kind.

This man is obtaining money under false pretenses.

If he visits you, he will likely ask if you read MOTOR AGE. Don't let him know you do but listen to his solicitation, detain him on some pretext and immediately telephone the police. Prefer a charge of obtaining money under false pretenses against him and telegraph MOTOR AGE, Chicago, at once.

Farm Tractor Trials

(*Concluded from page* 11)

most quickly. The great need of further standardization of parts and material, and perhaps some features of basic design, was brought out and the manufacturers were urged to make immediate arrangements for interchange of ideas and interchange of patents.

In emphasizing this interchange of patents, Howard Coffin referred to the history of the motor car and airplane industry and pointed to the action of the motor car manufacturers some time ago in arranging a cross-licensing agreement by which any

makers can arrange to use the patents controlled by others, and a similar arrangement just consummated among the airplane manufacturers at the instance of the Federal government which for all time puts an end to patent litigation which threatened to restrict materially America's production of air warcraft.

In opening the meeting, President Dunham called the tractor men's attention to the fact that America's entrance into the war is advancing the cause of the farm tractors tremendously, that the tractor has been called on quickly greatly to increase America's supply of foodstuffs for war needs. He also strongly urged the need for competitive tests of the tractors by which farmers could judge more definitely which particular one should be most suitable to his individual need. President Dunham, it is assumed, had in mind the fact that the plowing demonstrations this week as in past years, have been minus any great means of comparison upon which other than general conclusions could be based.

Tractors Do Belt Work More Than Plowing Work

ONE question which has been bothering tractor manufacturers as a fundamental starting point of their design to a great extent was settled at the S. A. E. meeting of tractor men, when A. P. Yerkes of the Department of Agriculture Bureau of Farm Management, told them that after a canvass of 32,000 tractor users throughout all parts of the United States, it was found that the three and four-plow sizes of tractors were available on the greater number of farms.

Another point which was new to most of the manufacturers is that belt power is of greater importance than any other one item of tractor work. This was embodied in Mr. Yerkes' statement that the farmer will use the tractor for driving other farm implements by belt, even to a greater extent than it will be used for plowing. This work includes such operations as silage cutting, threshing, corn shredding and shelling, wood sawing and other farm operations where light power is needed.

The general impression, he said, that farms are growing smaller, is wrong; that while the intensive farming movement is spreading, it is more confined to truck farms and that while the small farms under 20 acres have increased, the small farms of from 20 to 50 acres are decreasing in total number and in acreage. All the larger ones, however, are increasing. It is in this field that the tractor has its greatest use. These deductions were made from a government census which included the states of Illinois, Iowa, Missouri, North Dakota, South Dakota, Nebraska and Kansas, and the Department of Agriculture is certain that intensive cultivation in the shape of truck farming need not be considered in the tractor field at present.

In elaborating upon the finding of the Bureau of Farm Management that the three and four-plow sizes are available on a greater number of farms, Yerkes brought out the fact that the government census showed that the majority of farmers having tractors of larger size bought smaller ones when they got new equipment, and those with the smaller sizes got larger ones. This, of course, does not apply to the big ranches of the West where the big ten and twelve-plow gangs are utilized.

More Tractor Attachments

Another feature which was brought out by Mr. Yerkes was the distinct and immediate need of more farm implements designed especially for tractor attachment. He said that the field of the tractor at the present time is limited to some extent by difficulties in applying horse-drawn equipment to the tractors. In many of these equipments the efficiency is low as, for instance, in the mowing machine and binder in which rotary motion is needed, and which in horse-drawn equipment is obtained by transforming the linear motion obtained from the horse into rotary motion. When applied to the tractor, where we start with rotary motion of the engine crankshaft, it must be transformed to the mower, and changed back into rotary motion for cutter operation—a very indirect way when we have rotary motion as a first motive effort.

Tractors are a success with mowers, provided they cut a large enough swath. Some tractor and agricultural implement concerns have brought out special power equipment for the tractor, such as binders for oats, corn and wheat, corn pickers, etc.

Road hauling with a farm tractor is very little undertaken at the present, being about 4 per cent of the total work. So far it has been found that the motor truck or motor car with trailers is better.

According to Yerkes, the service problem to the farmer is one of the most important features and this takes three forms.

1—The tractor manufacturer must educate the farmer to the proper use of the tractor.

2—The tractor manufacturer must build a machine which will stand up under operating conditions and in unskilled hands.

3—Efficient and quick service organizations must be maintained, such that in case of a breakdown the tractor may be got into operation again with minimum delay.

Farmer Wants Service

The farmer wants service from the machine rather than from the manufacturer. If the machine were perfect, he would not need manufacturer's service.

To keep an imperfect machine running requires a perfect operator. The Department of Agriculture says the best way to take care of the tractor service problem is to educate the farmer to take care of it, and the best way to take care of the service problem is to eliminate it.

In the discussion Mr. Yerkes was asked how many tractors were in operation last year and stated that the Bureau of Farm Management had 34,371 names of tractor owners on its list, that Kansas alone has 3900 tractors, including steamers.

As to the average size of the farm using tractors, Mr. Yerkes stated that this varies in different states, that many old tractors sold five or six years ago have gone out of use, most of these being the very large ones. Asked if other farm equipment now horse-drawn is keeping back the sales of tractors, the reply was "No, but attempts of farmers to hitch horse-drawn apparatus to tractors often proved uneconomical."

In reply to the question as to the smallest size of tractor available for belt work, Mr. Yerkes stated that the two-plow tractor usually is too small for silage cutters and light threshing.

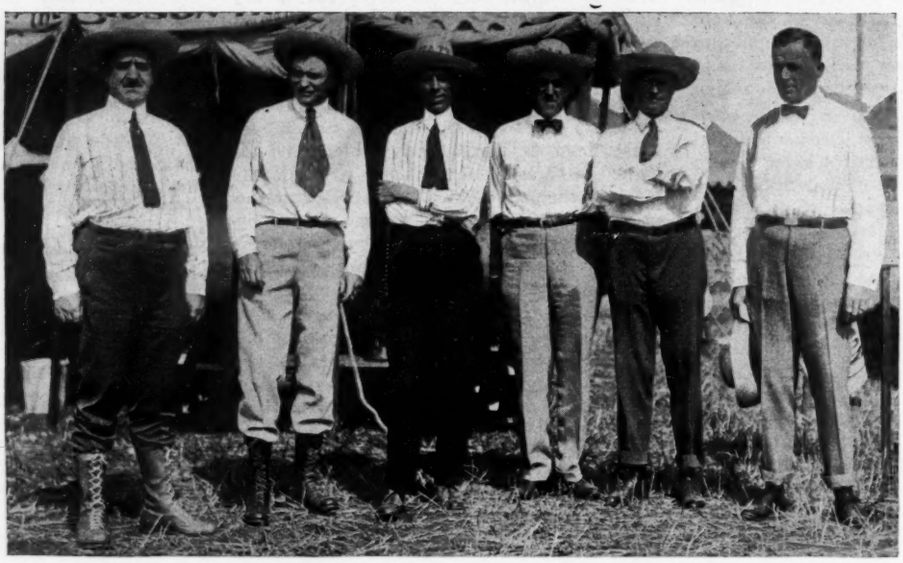
The fuel situation was stirred up by a paper by William Clark, chief engineer Wilcox-Bennett Carbureter Co., a concern that has done much practical work on the handling of kerosene in tractors. Mr. Clark told the makers that not a single one of them was using kerosene efficiently. He told them that kerosene can not be effecivively and efficiently used as a fuel until engine makers start solving the problem, in other words you cannot use kerosene satisfactorily and efficiently simply by installing a kerosene carbureter coupled with some new idea in manifold which may heat the air and perhaps break up the kerosene.

Power of Seven Tractors In New U. S. Engine

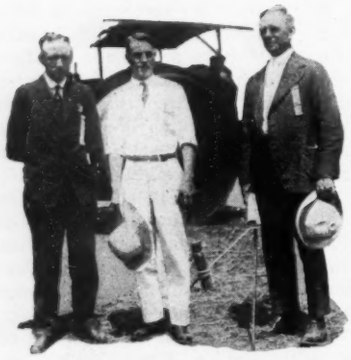
HOWARD COFFIN, chairman of the aircraft board, Council of National Defense addressed the tractor men from the broader angle of the automotive forces in the war, with particular reference to aeronautic work. In hooking up his talk with the tractor industry, he mentioned the fact that at the present time the United States government was finishing the work on U. S. aviation motor which is seven times as powerful and only one-third as heavy as a tractor engine—weighing only 1¾ lb. per horsepower. It is said that the United States is sending men by the thousands from America to fill aviation schools in Italy, France, England and Canada, whose possible students have been graduated and drawn into service. Italy, he says, has in the war now tri-planes of 2100 hp. each, having three 700-hp. engines of Isotta and Fiat make. These have a wing spread of 100 ft. There is being built now in Italy airplanes of 3400 hp. which carry loads of 10 tons of explosives. Italy has the fastest airplanes in the world, some of the recent flights being at a speed of over 140 m.p.h. America's navy will spend from $800,000,000 to $900,000,000 in aircraft this year. Already more than $600,000,000 has been appropriated for the initiation of the great work. More is to be appropriated, it is understood, this year if necessary.

Coffin added his plea for speed in tractor standardization, particularly in details of construction and in material specifications where it did not involve basic principles of design, and also urged immediate interchange of patent rights among the tractor makers. He made the very strong point that the worst enemy of any industry is one poor product and that if the farmer gets a poorly designed or poorly executed tractor, he will condemn all tractors, and it is only through standardization and interchange of patent rights that the possibilities of all tractors being condemned on account of a few poor ones can be minimized.

Personalities at Fremont Tractor Demonstration



Some of the big men in the industry came in a special car from the East to Detroit
Jay W. Weiss, works mgr., Hyatt; J. G. Heaslet, director Studebaker; A. P. Sloan, Jr., president United Motors; G. W. Dunham, president S. A. E.; Roy D. Chapin, president Hudson; and H. W. Griffith, general manager Remy

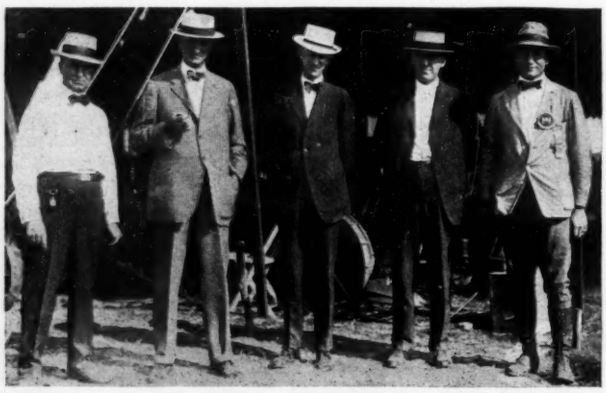


Twin City Tractor Men
H. C. Buffington, motor engineer; A. W. Scarratt, tractor engineer; M. B. Nelson, tractor sales manager

Vacuum Oil Crew
Left to right: W. H. Buderns, F. A. Peck, G. W. Wyland, W. J. Dukes, G. A. Round, C. K. Sinsabaugh, B. B. Mears

Mr. and Mrs. Dent Parrett entertained at the Parrett booth

Fred Glover, chief engineer Emerson-Brantingham

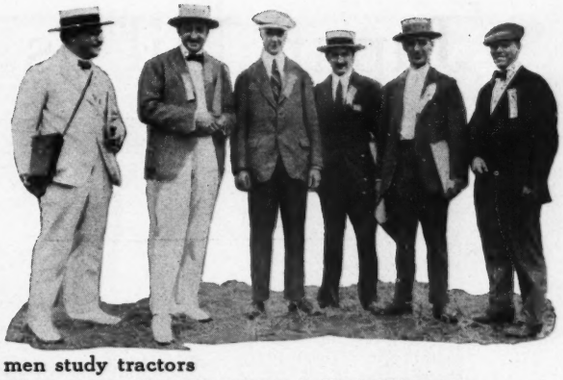


Moline Universalists
Left to right: O. R. Robb, manager, Omaha branch; B. Watson, manager, Des Moines branch; B. Funk, manager of engineering; F. G. Allen, vice-president and general manager; S. S. Turkenkoph, in charge of sales and service

Three Four-Drivers
Left to right: E. J. Jenkins, president; J. C. Jenkins, sales manager; Albin Johnson, secretary-treasurer

Three Class Journal men

A. Ludlow Clayden, Engineering Editor The Automobile and Automotive Industries; Fred Lee and C. H. Gurnett, advertising representatives Class Journal Co.

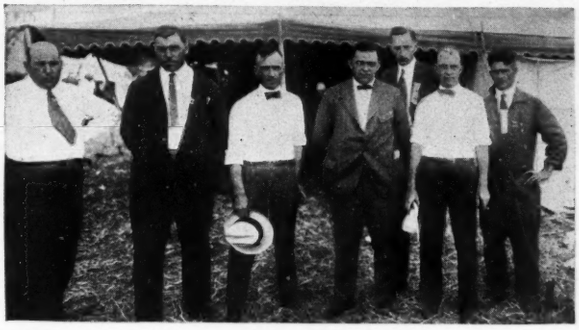


Parts men study tractors

Right: S. B. Duesenberre, Western sales manager, New Departure; J. H. Armstrong, Cutting, Armstrong & Smith; J. T. R. Bell, Gurney Ball Bearings; J. R. Thomas, consulting engineer; C. R. Armhurst, chief engineer, H. J. Walker Co.; Darwin S. Hatch, editor Motor Age

Atlas Tractor men

Left to right: F. B. Steele, sales mgr.; J. B. Wiles, asst. mgr.; C. E. Sargent, gen. mgr.



Behind the Bates Steel Mule

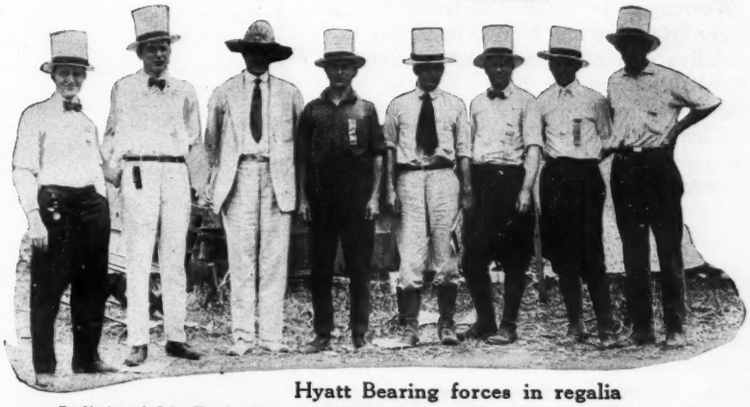
C. H. Bantley, H. H. Bremmer, Byron Snyder, E. E. Bates, C. R. Nichols, H. H. Bates, Leonard Spiers

Discussing the Field

At right, Juan Homs, commercial agent Bureau of Foreign and Domestic Commerce. Left, E. M. McCullough, mgr. National Implement & Vehicle Association

S. K. F. Ball Bearings

Left to right: C. R. Mabley, J. C. Long, J. D. Castino, F. J. Rider

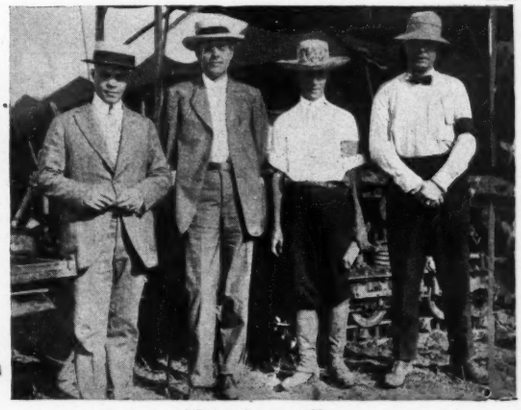


Hyatt Bearing forces in regalia

Left to right: E. A. Dean, J. S. Newman, J. B. Bateman, Thomas A. Russell, H. C. Kuechenmeister, Guy C. Brown, H. M. Carroll, J. E. Martin

Velie Tractors

Left to right: E. R. Gardner, mgr. of sales; O. E. Szekely, engineer; H. Mitchell, factory expert



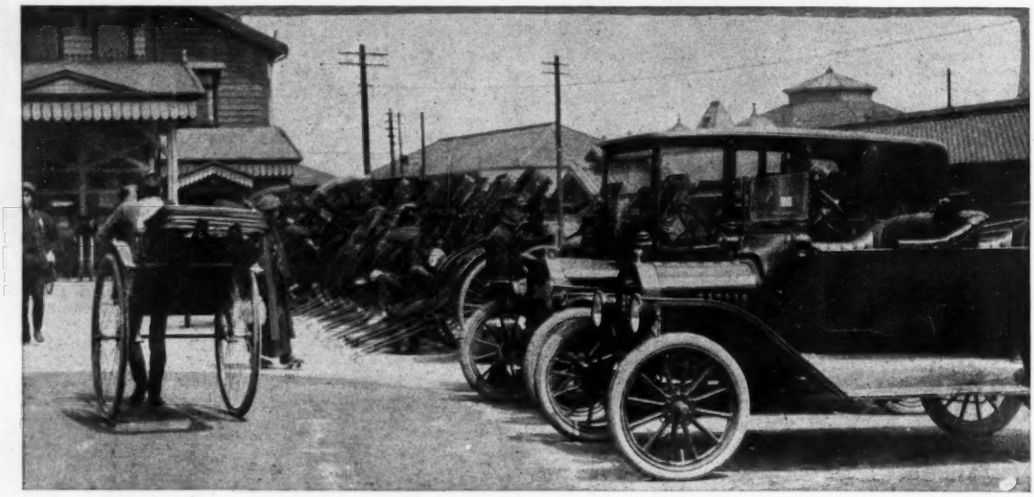
Holt Caterpillars

Left to right: H. B. Baker, sales mgr.; William Trumbull, chief engineer; H. W. Chown, Exhibit mgr.; H. P. Smith, mgr. of service

President Kincaid

Of the Kincaid Tractor Co.

Japan Nil as Motor Golconda



Taxis and rikishas in competition at the Uyeno station

Potential Buying Possibilities of Nippon's 60,000,000 Is Only One-Tenth an Equal Number of Americans

By Hi Sibley

THE American sales manager receives a request from a dealer in Japan for the sole agency for an American car.

"Let me see," says the sales manager, "just how big is this Japan? Hm—sixty million population! Ought to be a pretty fair market."

Whereupon he dictates a letter to the dealer informing him that he may have the exclusive selling rights in that country if he will contract for 2000 cars the first year, 3000 the second, and so on.

When the dealer opens the letter he smiles sadly and observes "I wonder when those Americans ever will become educated to the conditions out here." And he wearily replies, as he has replied to scores of other benighted American sales managers, trying to convince him that Japan is no motor car Golconda at present, but that with a modest beginning and much patience on the part of the dealer, that particular car will eventually develop a very satisfactory market for itself.

Buying Possibilities

It is true that there are sixty million persons in Japan, but their potential buying possibilities are only a tenth of an equal number of Americans. Japan has been poor, but she is rapidly getting rich; in fact, is rich to-day, comparatively. And then again, the motor car is young in Japan, and has not yet been received with any infectious enthusiasm, but that time is coming soon.

Therefore, if the American motor car manufacturer is seriously seeking Japan as a future market, he should observe the following suggestions:

1 Be prepared, for the present, to turn over the sole agency on a contract for a moderate number of cars.

2 Place the Agency in Tokyo, which is now and always will be the motor car center of Japan.

3 Make a nominal advertising allowance, for the dealer, to reach prospects most effectively must have his literature all translated into and printed in Japanese.

4 Make as prompt deliveries as possible, for from four to five months is consumed in transit.

5 Include a certificate of origin with the shipping documents for each car shipped. This is imperative, for without it the importer must pay 50 per cent duty instead of 35 per cent.

6 As soon as the business warrants, be prepared to ship a stock of repair parts on consignment, assuming your dealer is responsible. After paying first cost on cars for stock, with the duty and at present excessive freight, the dealer does not feel like carrying and probably will not carry a full line of repair parts. It is much to the manufacturer's interest that repair parts are on hand, for deliveries are so late that rather than wait for a new part from the factory, the owner will have the old one repaired, or a copy made, but with all respect for the Japanese aptitude at making copies, they cannot possibly be so satisfactory as a factory made part, to the detriment of the car and its local reputation. A certificate of origin should accompany the repair parts also, for without it the importer must pay 30 per cent duty instead of 25 per cent.

One of the first Japanese-built bodies placed on a Ford chassis

Gaining Popularity for U. S. Cars

With these points in mind and connection made with a reliable concern, there is no reason whatever why any average American motor car should not become established in popularity in this country, for in the next five years Japan undoubtedly is going to be the equal of any market in the Far East. China and the Philippines have exceeded her up to the present, but with her restless aggressiveness she is not going to be content to permit any other nation on this side of the globe to pass her.

One of the most reliable indications that the motor car is getting a hold on this little people is the rapidly growing business of the taxicab companies. Five years ago the Motor Taxi Cab Co. Ltd., of Tokyo, started in business with six cars at the railroad station. For the first two years it looked like a losing venture, for the Japanese only rode in them as a novelty, and after their first ride their curiosity was satisfied. Once a customer did not mean "always a customer"; rather the

reverse. At the beginning of the third year, however, the business showed a gradual, but substantial increase. Today this company is operating ninety Ford taxicabs and has thirty more on order. In a visit to four principal railroad stations with Mr. Shibayama, manager, the writer did not find more than three cars at any one stand, where ordinarily there are from fifteen to twenty to take care of patronage. However, this was the cherry blossom season, when everyone takes a holiday and spends more freely than at other times.

Tokyo Sales Headquarters

Tokyo is the headquarters for all motor car sales agencies. There are seven in this city at present—four Japanese and three American importers. Some of them have small branches in other large cities, such as Osaka, Kobe, Kyoto and Nagoya. Yokohama is only 18 mi. from Tokyo and is the best market outside of the capital, but has only one or two dealers, as the city can be more conveniently covered from Tokyo.

With one or two exceptions the sale of motor cars is but a branch of a general importing business, and generally only the larger and more responsible concerns indulge in motor car sales agencies, which up to very recently have been more or less of a precarious venture.

Sale & Frazar, an English-American firm, have done the largest business in motor cars in Japan, having imported over 400 Fords, which is the greatest number of any one make in the country. This firm also represents the Hupmobile and Scripps-Booth. At times they have had as many as forty to fifty Fords in stock. The Yanase Garage, one of the largest importers of motor cars exclusively, is doing a very satisfactory business in Buicks, which has become one of the most popular American cars in Tokyo, second, of course, to the ubiquitous Ford. The Japan Automobile Co., exclusive importer, has very substantially established the Maxwell and Hudson in Japan.

Display rooms are not very numerous; in fact they could be counted on the fingers of one hand. Considering the status of the motor car at present, however, these few are very creditable establishments, with new cars on exhibition in the front rooms of the place, and with garage space in the rear and well-equipped machine repair shops in charge of Japanese mechanics and foremen. Three of them have their own body-building departments for turning out bodies adapted to Japanese requirements.

The silent bally-hoo in front of the Ichimuraze theater. The banners advertise the play running, although it is not apparent to the average American

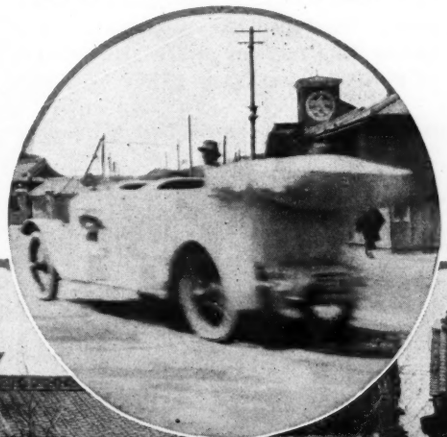
Body building is a rapidly growing industry and almost half of the cars imported are purchased chassis only. This effects a considerable saving in freight, which since the war has been a formidable item of expense. Rates have fluctuated a great deal in the last three years; the freight on a Ford at one time was $400, more than the original cost of a car, but the chassis now are coming from America for approximately $90 each. The pre-war —or ante-bellum—freight on a Hupmobile was $125, while now it runs from $200 to $225, for the chassis. A complete Maxwell costs about $210 freight from Detroit.

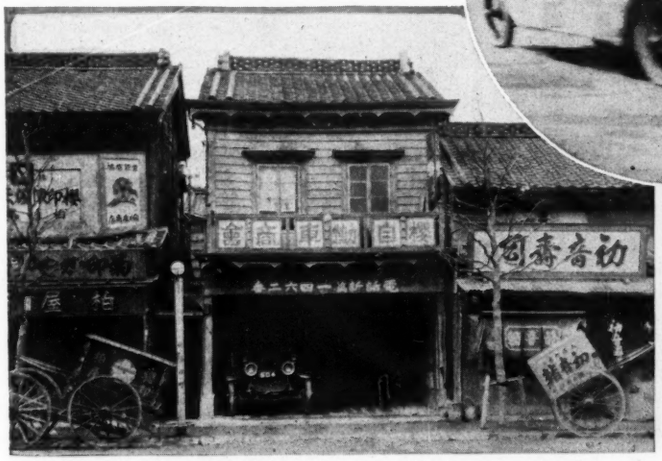
Transportation Charges High

By shipping without bodies the transportation charges are decreased from $50 to $150, and with the allowance made at the factory for the bodies, the purchaser has a fair sum saved toward a custom made, Japanese body more to his taste. These latter cost from $200 to $600, and with the Japanese creative genius for the beautiful, many cars, commonplace in appearance, are made ultra-smart. It is difficult for the observer to classify at a glance many cars with which he is familiar in America, for the original lines are so cleverly concealed.

The most popular type of body is the small limousine, with black or occasionally a dark blue finish, and thin gold stripe. Interiors are invariably done in light tan whipcord, and the whole job, in appearance, is the equal of the best American

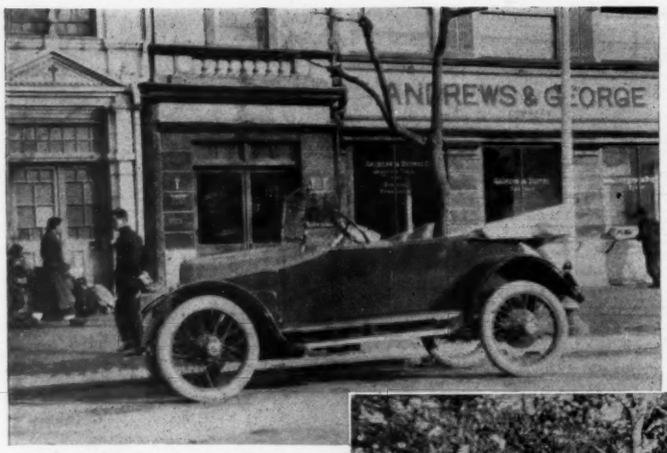
Below—An illustration of Japanese indifference to regulations. They take corners at high speed. They like it



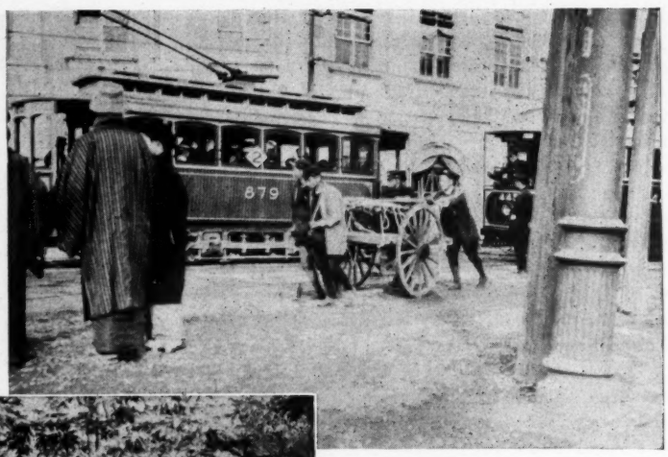


One of the typical garages to be found at intervals in major Japanese cities. Some of them are very small

A "tyre" repair shop for motor car, bicycle, motorcycle and 'rikisha tires. These are rather numerous here



Headquarters of Andrews & George, Cadillac and Overland dealers, on the Ginza, Tokyo's main retailing thoroughfare



Transportation in Tokyo is of varied kinds. Street cars and jinrikishas, vie with each other for favor with the inhabitants

Typical garden which is found throughout Japanese cities. Some of them are very small but all have the inevitable stone lamp and all have a special appeal to visitors

work. With their consummate taste in delicate works of art and their traditional skill in producing lacquered work, the Japanese cabinet makers have lived up to their reputations in turning out these handsome bodies.

The only two objections to the Japanese-built body are the weight and, in rare cases, mechanical shortcomings, such as allowing too small space for the free manipulation of the gearshift, or bringing the seat too far forward for leg comfort. However, as all Japanese-owned cars are driven by native chauffeurs, who are much shorter in stature than the average American or Englishman, this last is no serious oversight. The five body-building shops visited turn out about fifty jobs per month.

In selling a car the salesman has to employ far more patience and persistence than in America. The prospect does not saunter casually into a salesroom, ask for a demonstration, listen to a description of that particular car's qualities, and a few days later present a deposit check on an order. In Japan the salesman literally has to "dig up" his prospect and "work on him" for some time before he is convinced that investment in a car will bring equal returns in comfort and pleasure. The customary procedure is first to mail to the citizens of means in a locality an illustrated catalog, printed in Japanese, describing the car's merits in lavish Japanese terms. Next the salesman must become acquainted with the prospective prospect, and win his friendship, for in Japan business is done on a friendship basis more than in any other country. After that negotiations depend on the inclination of the prospect. It is much the same story as it was in America fifteen years ago, when the salesman was obliged to use the utmost tact lest he frighten the prospect to death with a blunt proposal that he buy the car.

Here is a point that will throw much light on the local situation. The Japanese are intensely patriotic; they are greatly prejudiced in favor of Japanese dealers. The writer has found this to be the case in many other lines, not at all connected with the motor car business. A Japanese will never buy from a foreigner if he can get the same goods, or even an inferior imitation, from one of his countrymen. This attitude toward the outsider will be better understood from the fact that, in a country as rich in trade possibilities as is Japan, the foreign population is less than one two-hundredths of 1 per cent, all nations included! And only a fraction of this number are importers of goods.

Another illustration of this sentiment was given in an incident soon after the writer arrived here. The president of a large concern indirectly interested in the expansion of motor car trade was asked to furnish a list of all the prominent motor car dealers in Tokyo. A list was given in good grace, but not one foreign establishment was mentioned.

However, while the Japanese dealers in-

Headquarters of Sale and Frazer, Tokyo, largest dealers in motor cars in Japan. Motor cars, however, are but a small part of this company's business

disputably are favored by prospective purchasers of motor cars, and will enjoy a large share of the business, as is their due, it is probable that the American dealers will be found to give the better service, from their larger experience in such organizations, and in time come to be recognized as leaders in this particular commerce.

The use of cars for hire is increasing proportionately with passenger pleasure cars. Sightseeing car routes have been established in various parts of the country, within the last three years, where there are no railroad lines, and for passenger transportation in some mountainous sections. This promises to develop a market for cars of this type, though at present most of the cars in use are Fords with a special body with two rear seats, carrying eight with driver, and small buses mounted on light chassis. New lines and cars are being added each season, and with the taxicab, they promise rapidly to popularize the motor car.

The jitney bus has not yet made its appearance, and it is doubtful if it will for some time, as street car lines with 5 sen—2½ cents—fare cover Tokyo pretty thoroughly, as well as other cities, and the price of gasoline is almost prohibitive.

Taxicab stands are located at the principal railroad stations, the Tokyo, Shimbashi and Uyeno, and here uniformed porters employed by the taxicab companies solicit patronage from incoming trains, in both English and Japanese. Large sign boards in Japanese and English further inform the possible patron of fares and distances to various parts of the city, and the Motor Taxicab Co., Ltd., issues a folder with a map of the city showing taxicab stands, distances and fares. These last are 30 cents minimum up to $7.40 for 54 English miles, by the meter, with which each car is equipped.

Touring cars and inclosed cars for hire are much in demand, and the greater the capacity the better. These pick up most of their passengers in the theater and tea house districts, for the Japanese, in spite of their thrift, are a pleasure-loving people and periodically go forth to have a high time. It has become quite the thing for the man-about-town to do his cabareting **a la taxicab.** Small garages, some twenty in number, are scattered about the city in the most profitable localities, and usually hold two or three cars; frequently they are just big enough for one small car to squeeze into.

As for garage storage or care of privately-owned cars in a public garage, no permanent rate has been established, since the owner rarely gets so far away from his home that he cannot get back the same night. A car goes into a public garage only for repairs, or repainting, or adjustment.

MOTOR CAR DEALERS IN TOKYO, JAPAN

Firm Name	*Representing*	*Branches*
Sale & Frazar	Ford	Yokohama
	Hupmobile	Osaka
	Scripps-Booth	Nagoya
		Moji
		Keijo
		Dairen
Andrews & George	Cadillac	
	Overland	
F. W. Horne	Chalmers	Osaka, etc.
Yanase Garage	Buick	
	Wolseley—English	
Nippon Jidosha Kabushiki Kaisha (Japan Automobile Co., Ltd.)	Maxwell	
	Hudson	
	F.I.A.T.	
	Daimler	
Fujiwara Shôkai	Packard	
	Paige-Detroit	
	Chevrolet	

Cities	*Population*	*Number of cars in vicinity*
Tokyo	2,250,000	841
Osaka	1,300,000	123
Yokohama	394,000	178
Kobe, seaport	380,000	92
Nagoya	378,000	45
Kyoto	442,000	9
Nagasaki, seaport	176,000	9
Hiroshima	142,000	3
Shimonoseki, seaport	58,000	26
Moji, seaport	.....	29
Island of Hokkaido	.....	11
Island of Shikoku	.....	20
Island of Kyushu (includes Nagasaki and Moji)	.....	47

The total number of motor cars in Japan, including trucks, is 1656.
Population of Japan, 62,000,000.

A Japanese-built body on a Ford. Owned by the charge de affaires, American embassy,

The palatial central station in Tokyo shows architecture that might be fitting for any city in the world

Paint Your Own Car

Step-by-Step Process Outlined by Which You Can Apply a First-Class Finish

In Two Parts—Part II

By J. M. Coles

FOR a better class job apply over the primer a coat of roughstuff filler made of equal parts, by weight, of keg, oil-ground lead and roughstuff filler, beating these pigments to a stiff paste in coach japan and rubbing varnish, half and half. The next day examine the body and stop or face up any surface inequalities with some of the glaze putty already mentioned, using a little more whiting to stiffen the putty up some.

The following day put on a second coat of the roughstuff, and each succeeding day put on a coat, until five coats are applied.

Ready for First Coat

Stand the body aside for a week and then rub the body of coarse paint down with rubbing brick and water to a smooth and uniformly level surface.

In the case of either class of job we now have the body ready for the first coat.

Sandpaper the surface lightly with No. 0 sandpaper, dust off and as a good ground for the dark blue apply either a coat of dark brown or of lampblack. Mix this brown or lampblack coat in one part raw linseed oil and five parts turpentine. Let dry 24 hr.

Then take some of the dark blue japan ground—of which there are many shades and names—and thin to a nice brushing consistency with turpentine, using one part oil to eight parts turpentine, and apply a coat.

Let this coat dry for 24 hr. Then make a color-varnish of the blue by using the pigment at the rate of one-fourth pound of color to two pounds of varnish. First thin the color with turpentine only. Then add the varnish. Apply two coats of this varnish-color, allowing one day to elapse between coats.

Flat the first coat with clean, curled hair obtained at an upholstering shop. Second coat should be rubbed off lightly with a soft, moist wool sponge dipped in pulverized pumice stone.

Wash surface up and apply a coat of rubbing varnish into each pint of which stir one-half ounce of the body blue. Rub this coat after four days with pulverized pumice-stone and water, wash up thoroughly, and for a strictly high-class job apply a second coat of the rubbing varnish. If the body is to be striped, apply the lines before putting on the last coat of rubbing varnish and do not add any color to this last coat. In the event of letting the body go plain use a few drops of blue in the rubbing varnish. Clear varnish discolors and destroys the original purity of the blue, and a little color in the varnish preserves this purity.

After four days rub the last coat of rubbing varnish with water and pulverized pumice-stone, wash up and finish with a coat of elastic boat-finishing varnish.

For the chassis, clean carefully with one part crude oil and two parts turpentine. Then sandpaper with No. 1½ sandpaper.

Prime with keg, oil-ground lead, cast to a gray color by adding a little lampblack. Make the priming coat to contain three parts oil to five parts turpentine.

After four days sandpaper this coat, putty up all defects, and apply a second coat of gray pigment, containing two parts oil and six parts turpentine, adding, in both instances, a teasponful of oil to each pint of the color. After three days again sandpaper the surface and apply a third coat of the gray mixture, using in thinning the pigment one part oil to six parts turpentine.

In the course of two days slightly sandpaper this coat, clean up and put on a coat of the final dark gray color.

Use a japan ground color, thin with turpentine and add one part oil to every ten parts of turpentine.

For second coat make a varnish color, using proportions as above advised for the body. In due time rub down lightly with curled hair and apply one coat of rubbing varnish. After three days rub this coat down with water and pulverized pumice stone and finish with a coat of chassis-finishing varnish.

Pigments differ so radically in quality and composition that we can only give the materials, as follows:

BODY

Primer	½ gal.
Putty glazing	6 lb.
Sandpaper	12 sheets
Roughstuff	1½ gal.
Preparation color	⅛ gal.
Color	⅛ gal.
Varnish color	½ gal.
Clean rubbing varnish	3/16 gal.
Finishing varnish	¼ gal.
Coach japan	3/32 gal.
Rubbing brick	1 lb.

CHASSIS

Primer	⅜ gal.
Surfacing coats	½ gal.
Putty	½ lb.
Sandpaper	12 sheets
Color	⅛ gal.
Varnish color	⅜ gal.
Rubbing varnish	⅜ gal.
Finishing varnish	¼ gal.

Brushes suited to the above work are as follows: Primer, roughstuff and surfacing coats, 5-in. round or oval bristle brush.

Color coats for body: 2-in. flat camel's hair brush.

Color coats for chassis: 1¾-in. flat badger hair brush.

Varnish coats for chassis: 1½-in. flat badger hair brush.

Varnish coats for body: 1-in. flat badger hair brush. Flat half-electric 2½-in. bristle chisel-point brush.

Varnish color coats for body: Chisel-point brush, 1-in. and 2½-in. dusters. One flat gray bristle for body and one round gray bristle for chassis.

Lamp and windshield brackets, etc., should be gone over with emery cloth to roughen them and then given a priming coat of a good lead paint. This is followed in the same way as the body proper with a coat of color, one of varnish color, which is rubbed well and finished with a coat of varnish.

How to Stripe

In striping most painters find it best to be conservative if they would keep the job in good taste. Simple lines which harmonize with the field color while serving to enhance its appearance appear to be most successful. Several combinations which have been found to give pleasing results are: One-half inch lines of aluminum, touched on one edge with glossy black in a narrow line furnish striking contrast to a body of battleship gray. Several other colors may be substituted for the black line with excellent results. Two colors eminently suited for this purpose are orange chrome and English vermilion.

For fields of medium and deep blue, narrow strips of dark gold bronze glazed with a light tone of ultramarine blue present a very rich combination.

Varnish enters into the painting and finishing of the car over the color. To be more exact, it is first used to make up the varnish color, the process of which is like this: First thin the color with turpentine, and then to one-fourth pound of color add two pounds of rubbing varnish, stirring the mixture intimately. In fact, the best way to mix the color and the varnish is to pour the diluted color and the varnish into a varnish can and then shake vigorously until all the separate ingredients become one.

Never use oil in connection with a color that is to be used for making varnish color. In all cases let the varnish largely predominate. Flow the varnish color freely over the surface and let it stand in a warm place until it dries thoroughly. Rub lightly with a thin perforated felt pad, moistened and dipped in pumice-stone flour, knocking the glass down uniformly over all the surface. Wash up clean, and, if necessary to develop a deeper intensity of color, apply a second coat of this varnish color, rubbing it, in due time, in the same manner as advised for the first coat.

Again wash up, and then to a pint of clear rubbing varnish add, say, one-half ounce of the color to neutralize the discoloring effect of the varnish. Give this coat plenty of time to dry and then rub with water and pumice-stone flour. Avoid rubbing across the ends of the panels, and keep well off the edge of moldings, corners, etc. Clean up

and do all the lining and ornamental work.

Next apply a coat of clean rubbing varnish, flowing on a full, heavy application. After three or four days rub this coat down with water and pumice-stone flour, using for the work a one-half inch perforated felt pad. For the moldings, carved work and any parts having sharp edges use in place of the felt pad a piece of heavy broadcloth. The soft goods will form up better to such parts of the surface and will not cut through the sharp edges so quickly. Work to get a smooth, uniform surface with the same depth of varnish protecting all the parts.

After surfacing in proper manner the first coat of clear rubbing varnish, and washing it very clean, proceed to apply a second coat of the clear rubbing varnish, using, as in the first instance, a plentiful flow.

If brush marks and all the other disfiguring things which mar the surface upon the slightest provocation are avoided, and the varnish comes forth practically without a blemish, it will hardly need more than a mere dulling down with the water and pumice-stone flour. For all ordinary good work these two coats of varnish color, and the two coats of clear rubbing varnish, should suffice, but in the event of having extraordinarily large surfaces, another coat or two of rubbing varnish will be necessary.

Paint Brass Black

An excellent, simple formula for painting brass black consists of the following: eight ounces of asphaltum; one-half ounce of dark gum anime; eighteen ounces linseed oil; one and one-half ounces dark gum amber; and two and one-half ounces spirits of turpentine. The asphaltum and gum anime should be fused together and fifteen ounces of linseed oil added. The other three ounces of linseed oil should be added to the amber, which should be boiled and added to the mixture, the boiling being continued until the mass reaches a plastic condition. This may be easily detected by removing a little of it and allowing it to cool. Then the heat should be withdrawn and the turpentine added.

Another process of painting brass black is the enamel process, which requires a large amount of experience and a high degree of skill as well as special heating devices, etc.

Among the many sorts of serviceable varnish which may be used to protect iron surfaces against atmospheric or other chemical influences, black varnish is most frequently used. This material is easily prepared by melting common asphalt in a kettle or boiler and, while stirring the mass, adding crude oil until a sample taken of the mixture shows suitable varnish consistency after cooling. By heating the varnish it may be dried in the shortest time without fearing to ruin it, as this black iron varnish resists high temperatures very effectively. It is as black as pitch and is also as elastic as may be desired for any purpose.

This varnish may be applied to brass as well as iron surfaces. It is, however, sometimes desired to use a varnish other than black, and in these cases, especially where high-polished brass or zinc surfaces have to be dealt with, the so-called gold varnishes will be found of advantage.

If it is desired to secure a natural wood finish on any part of the car the varnish and coloring matter should be taken off, either with varnish or paint removers, which may be obtained at any paint store, with scrapers or by burning, although the latter operation is one which requires a skilled workman. After getting down to the wood this should be gone over with sandpaper, after which oxalic acid may be applied, which, in a few minutes, will bleach the wood to its natural color. It is then washed off with cold water and sandpapered as soon as it is dry. A filler should be used where necessary to fill the wood fibre. This can be tinted as desired. After this has dried in for a day or two, two or three coats of orange gum should be applied, the surface being gone over with sandpaper after each coat. The usual coats of varnish, two or three of the rubbing variety and one finishing coat complete the operation.

Dull Finish Popular

The dull finish is very popular for many reasons. It is attractive, frequently stylish or smart looking, and, last but not least, very durable and one which does not show dust and dirt easily. Enamel or flat drying paints are frequently used to obtain a dull finish, but the most satisfactory process from every point of view is to carry along the painting operation in the usual manner with the customary coats of varnish and then rubbing the finishing coat until it bears a dull, lusterless appearance.

Hand-buffed leather tops may usually be put in first-class condition by washing with castile soap. For the machine-buffed variety, however, a thin coat of some good top renovator is required to replace the worn-off enamel. For tops of mohair a good brushing with a whisk broom followed up by treatment with a soft brush will suffice to rejuvenate their appearance.

CAUSE OF RENAULT DISASTER

Paris, July 25—A debate in the French Parliament reveals the fact that the collapse of a portion of the Renault factory, news of which was published in MOTOR AGE recently, when about thirty lives were lost, was caused by overloading of the floors and the vibration of heavy machinery. The building was of steel girder and brick construction, with rather light foundations. Small machine tools were on the ground floor, while on one of the upper floors there were 100 lathes, each one weighing from 7 to 8 tons. In 1916 the workpeople sent a deputation to Louis Renault declaring the building to be dangerous. The building contractors were consulted, and after an examination they declared that there was no danger and the workpeople were in error in supposing that the building was likely to collapse. Work thus continued as usual. Blame is attached to some of the factory officials for not ordering everybody out of the building as soon as the first warning cracks were heard. The majority of the workpeople rushed for safety and owe their lives to this precaution. Others, assured that there was no danger, remained at their posts and were either killed or injured.

Wings for Our War Eagles

(Concluded from page 15)

provided for the time being. The industrial capacity, stocks on hand and i.ı ght, has been found through a comprehensive survey of the manufacturing field and the Aircraft Production board knows exactly what to expect of each line of ind stry.

Quantity production of engines, that will equal those made by skilled hand labor abroad, is expected to be turned out by the motor car companies by machinery. These concerns will make a standardized United States airplane engine, which is being perfected now and which is based on the net planning of over fifty government scientists and distinguished engineers. Engines that will compare with the Gnome, Rolls-Royce, Hispano-Suiza and the Sunbeam are expected to be turned out in large quantities. This one feature of the aircraft program promises to be knottiest of all and if it succeeds, American motor car makers will have hung up a record more than in keeping with their traditions for spectacular successes.

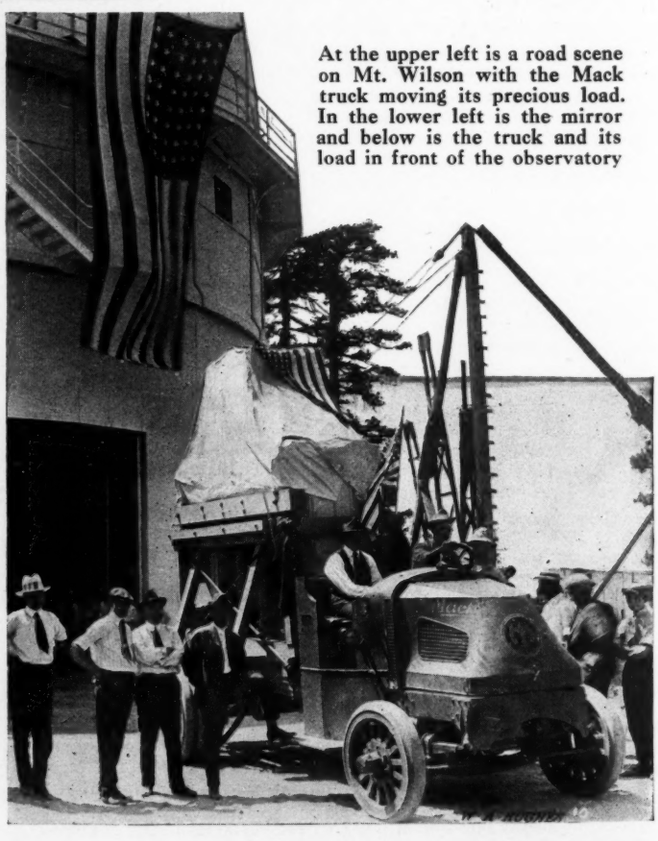
An achievement almost as important is predicted in the matter of kiln-drying of spruce for airplane construction. Heretofore no one would think of putting anything but air-dried spruce into airplanes, but it is no secret in official circles that a process of kiln-drying for spruce already has been perfected, which means that one of the greatest obstacles to the development of aeronautics since the Wrights made their first flight has been made. It will be second in an industrial sense only to the forthcoming attempt to attain quality results by machinery in the development of airplane engines. Of the 75,000,000 ft. of spruce which must be cut, dried and put into use in airplane bodies, two-thirds will go to our Allied birdmen. For each airplane 1,000 ft. of spruce is needed, of which only 200 ft. actually go into the machine. The other 800 ft. has gone to waste or has been used up afterwards in packing boxes and for miscellaneous purposes.

It will be well for the country not to be carried away in its enthusiasm. A billion-dollar job is a mammoth job, whether the goods to be fashioned are hairpins or airplanes. Being airplanes, with the certainty of lives being needlessly sacrificed if weak or imperfect machines are given to our men at the front and in the training camps, the job before the industries of the country becomes doubly difficult and momentous. Six months will be required for our factories to adapt themselves to the new situation. Commercial profits are not merely the goal this time. Victory hangs in the balance. Even our national existence may be wrapped up in the colossal undertaking.

Priceless Observatory Mirror Takes Ride

SAID to have been the most precious load ever entrusted to motor truck transportation, the 100-in. reflecting mirror, the largest in the world, was successfully and safely delivered to the new observatory of the Carnegie Institution, of Washington, D. C., on the summit of Mt. Wilson, near Pasadena, Cal. The mirror is intended for use in the huge telescope that has been in process of construction for four years and its arrival at the top of the mountain signaled the practical fruition of twelve years of endeavor. Scientists from all parts of the world have visited the new observatory and when they learn that the glass reached its final destination without injury they will be relieved of apprehension.

The mirror weighed 4½ tons and with the cradle and box that contained it made a load of 7½ tons that was taken from the Institution's plant in Pasadena to an elevation of 6000 ft. above sea level on a 5½-ton Mack truck, driven by J. A. Stoner, the western representative of the International Motor Co. The truck conveyed its invaluable burden a distance of 15 miles, 9½ of which were on mountain trail so narrow that its wheels had to break their own road the most of the way. The average gradient of the Mt. Wilson road is 12 per cent and there are a number of pitches with a 14 per cent grade and two that approach 20. The big Mack's wheelbase was 14 ft. and it was necessary to back and fill



At the upper left is a road scene on Mt. Wilson with the Mack truck moving its precious load. In the lower left is the mirror and below is the truck and its load in front of the observatory

in making all the turns leading into the switchbacks.

This is not the heaviest load that has been taken up the trail by truck, in fact, two sections of the telescope weighed almost 13 tons each but it was by far the most important. Steel castings, no matter how expensive, could be replaced but it would be impossible to duplicate the huge glass disk. The entire observatory and its contents stand as a monument to the motor truck. There are 600 tons of structural steel in the dome that rotate at the touch of an electric switch. The exterior of the structure is of corrugated iron supported by steel and concrete. The base of the telescope is of solid concrete as is the foundation for the whole building. Timbers, steel cables and supplies added to the weight of the various parts, the cast work and concrete make more than 1500 tons of materials, every pound of which made the ascent on trucks. It is estimated that had it not been for the utility of the truck, the observatory would be ten years removed from its present state of near completion.

Four Years in Making

The giant mirror is 100 in. in diameter and 13 in. thick. It was ordered cast at St. Gobain's, France, in 1905, and was received at Pasadena in 1909, four years having been required for its making. Two years were spent trying to secure a better piece of glass but this was declared impossible. Grinding began in the Pasadena plant in 1911 and half a ton of glass was removed from the original piece, most of it being taken from the concave, or upper side. An entire year was required to perfect a 60-in. plane mirror to test it with. War conditions have made it impossible to obtain another such piece of glass. There is no estimate of the value of the glass as it is priceless because of what it represents, but it is divulged that more than $100,000 has been spent on it. It is spoken of by scientists as the "Hooper Glass," because J. D. Hooper is the donor.

The entire city of Pasadena was dumfounded the day before the truck was scheduled to convey the glass up the mountain by the declaration of a crank that it never would reach the top in safety. The alarmist was immediately arrested and put in jail. An armed guard escorted the glass and every timber in a bridge spanning a canyon over which the truck must pass was minutely inspected. Careful watch was kept on every tree and overhanging ledge of rock and a convoy truck preceded up the mountain. It was feared the road might be mined.

Hundreds of thousands of dollars of the Carnegie fund had been spent to build the enormous dome on Mt. Wilson to house the mirror and telescopic apparatus and any disaster to the glass would have been nothing less than a catastrophe. The glass is so sensitive that it is affected by the heat from a man's body 3 ft. distant. Throughout the grinding process it was kept shrouded in lintless cloth to prevent a particle of dust from coming in contact with it. A special French rouge was used in the polishing and the silvering was a painstaking process. It was known, of course, that the vibration of the truck due to the engine and inequalities in the road would set up constant distortions, so as many precautions as could be devised were used to keep these to a minimum.

The "clothes" for the glass while in transit were planned in advance on paper as carefully as an architect prepares to build an intricate structure. First it was covered completely with wool padding and placed in a paraffine-lined, octagonal box. The padding served to protect against jolts and also against changes in temperature. The glass always had been kept at a fixed temperature during the grinding process and was so sensitive that it could be worked upon only a few hours each day during the latter stages of preparation.

Carried on Springs

A cradle was made for the box out of heavy timbers that extended beyond the frame of the truck. This cradle was tied by iron bars and bolted to the truck chassis. Sixteen powerful yet delicate coil springs were placed on each side and below, between the box and the cradle, so that it rode as lightly as a feather floats in the breeze. The top of the cradle extended 10 ft. 9 in. above the truck and to lift or sever telephone wires that cross the trail repeatedly a man was stationed on top with a pair of wire clippers. Once he miscalculated and signaled to the driver to proceed but there was not sufficient clearance and by the cradle coming in contact with a heavy guy wire, the pole at the side of the road was snapped off at the base.

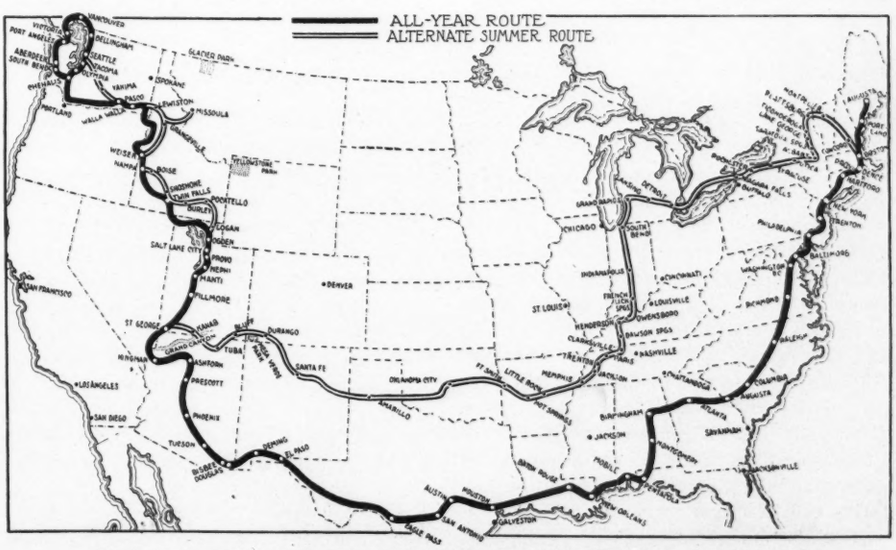
The Mack truck, which was geared 39.83 to 1 on low made the trip entirely under its own power. The running time from the lower toll gate to the observatory on the summit was less than four hours. The temperature on the trail was more than 90 deg. and three times stops were made to change the water in the radiator.

An All-Year Semi-Marginal Highway

THE last few months, when the advantages of highways as a military adjunct have been put before the people of this country as never before, some activity is noted in the establishment of marginal highways, that is, **roads along our borders.** Now comes the Evergreen Highway Association, a western organization, to promote the location, construction and maintenance of an all-year, military and touring route from the North Pacific Coast through Washington, Oregon, Idaho, Utah, Arizona, Texas and then along or close to the border to the eastern terminal at some eastern point, probably Augusta, Me.

The purpose of this organization is not to rename highways but rather to name a route instead of a road. It is believed the tentative route shown in the map herewith will be one that offers driving possibilities the year around and hence the name—Evergreen. The organization purposes to procure the through marking of the route with serviceable signs, to maintain information bureaus for tourists and to foster all-year touring. Included in its endeavors will be the encouragement of forming interstate highway associations, local good roads associations and motor clubs for the purpose of co-operating with the association in urging the several units of government to enact legislation and the adoption of programs tending to the speedy improvement and proper maintenance of highways.

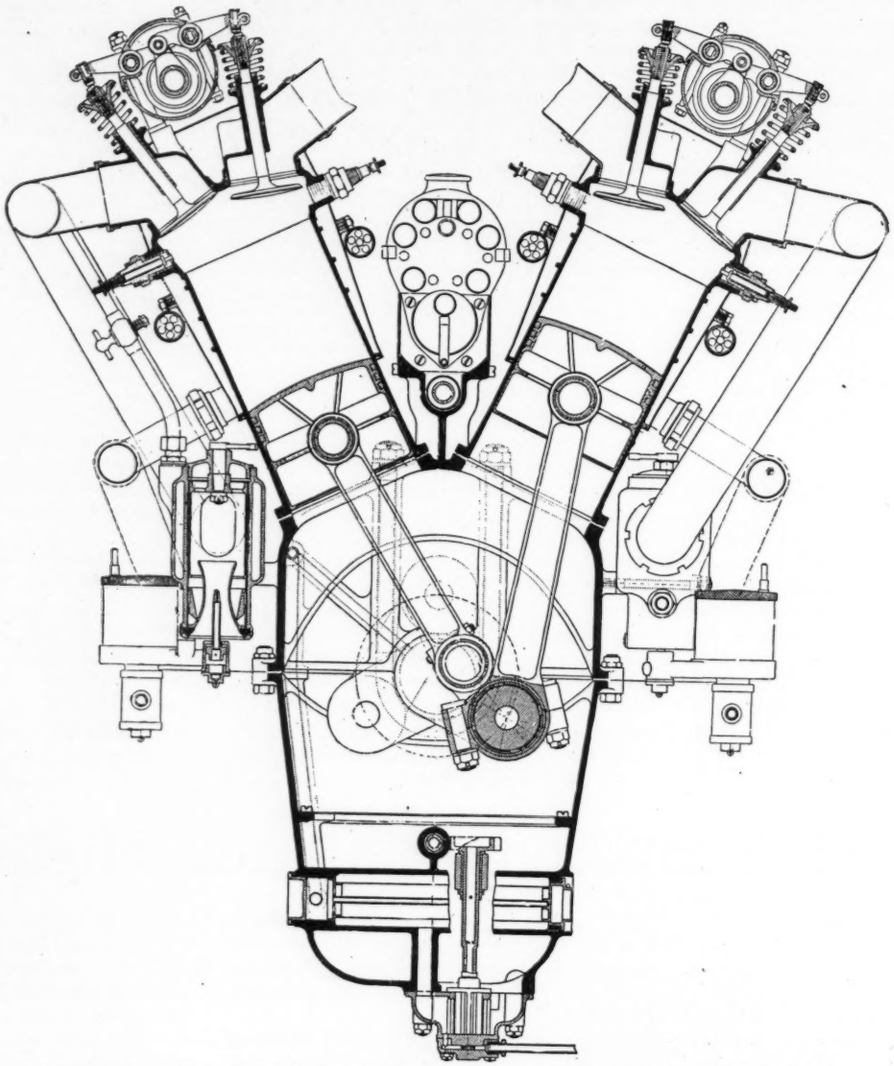
Just at present there are two scout cars being sent over the route for logging the western part. The map shows an alternate summer route, although the one farthest south will be travelable all the year. It will be noted that this highway will combine parts of several named roads, many of which now are in good touring condition. Hence Evergreen is simply a name.



Tentative routing of the Evergreen highway with alternate summer route

Standardized Airplanes Necessary

Allies Have 87 Types of Engines As Result of Failure to Concentrate Early in War



Section through a Renault twelve-cylinder airplane engine which develops 245 hp. It is used with a geared-down propeller

By W. F. Bradley

DESPITE an airplane development which has assumed fantastic proportions, comparatively little attention has been paid by Allied engineers to the question of standardization. The general plan appears to have been to secure the greatest output without stifling initiative; or indeed, to encourage initiative even if it is somewhat to the detriment of output. The plan is open to criticism and its weakness is apparent when it is stated that there are in England thirty-seven different types of aviation engines and not far short of fifty in France.

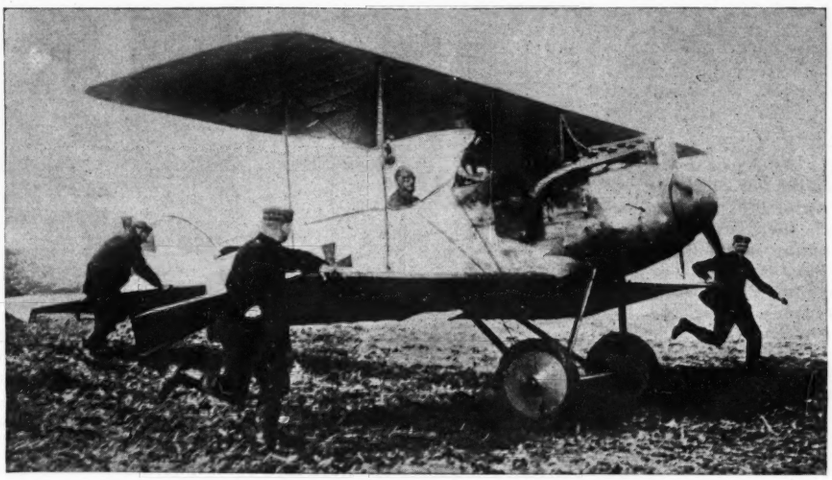
In view of the state of aviation development in Europe at the outbreak of war, it is doubtful if any other plan would have been more successful, and it is certain that the German system of complete standardization and absolute uniformity would not have satisfied French or British temperaments. Under the German system there have been developed five aviation engines; two Mercedes, two Benz, and a German Gnome, which is a copy of the French engine as it existed at the outbreak of war. Everybody is building one or another of these types, the result, of course, being an all-around simplification in both the factories and in actual service.

Now that progress has been made, that competition has brought forth planes and engines infinitely superior to anything possessed a couple of years ago, the disadvantages of varied types are making themselves felt. It is only now that the question of uniformity and standardization is being really seriously considered. There are declared to be plans in hand which will put an end to the lack of system existing up to the present and thus render possible an immense increase in output.

Propellers and Magnetos Interchangeable

Undoubtedly much remains to be done, for the only interchangeable parts in airplanes or airplane engines, at the present time, are propellers and magnetos. In France the type of magneto adopted is the S.E.V., being a development of the Bosch as it existed prior to the war, the base and coupling of which has been made uniform throughout the service. Thus, any magneto on any engine will interchange with any other. Propeller mountings are also standardized, there being two dimensions according to whether the horsepower is below or above 100. The difference between the two only relates to the length of the shaft. Engine mountings are not standardized so that every plane has to be built for one type of engine and will not receive any other. Now that there are in existence quite a number of engines differing only in structural details, the disadvantage of being unable to change from one make to another without modifications in the structure of the airplane is felt quite seriously. It is certain that this is one of the features in which standardization will be sought.

Except that everything is to metric system, there is no standardization of screw threads, nuts and bolts, cotter pins or washers, turnbuckles or sizes of wires. Every maker has been allowed to adopt his own sizes without any consideration of what was being done by his neighbors, and without any effort towards uniformity. The same remark applies to wing planes, spars, distances between plane supports, etc. In view of the great simplicity of airplane construction—as distinct from air-



Prince Friedrich Karl of Prussia starting on his last flight in an airplane of his own construction. The Prince was made prisoner while flying over the British lines and died of his wounds. He is the first Hohenzollern to be killed flying an airplane

plane engines—which makes it possible for coachbuilders, carpenters and others of no previous experience in airplane work to produce successfully to given designs within a very short time, it is surprising that there has not been an earlier attempt at uniformity of parts.

War Brings Factory Co-operation

While there is little general system, the war has brought about a co-operation between factories which would not have been dreamed possible less than three years ago. The construction of a really successful engine is not confined to the firm responsible for the design. Some successful engines are being produced in as many as twenty different factories, with twice this number of subcontractors making various parts for these firms. There are many licensees producing more engines per month than the parent firm produced in a year before the war.

From the standpoint of after-the-war production this is of extreme importance. Water-tight compartments between factory and factory have been broken down. A once fourth-rate firm gets the advantage of the experience of the finest engineering shops; firms which not long ago knew next to nothing about the heat-treatment of metals know everything now; shops which before the war handled B.N.D. and other high-grade steels by the pound are now handling them by the ton; limits of tolerance which were considered impossible in many factories before the war have become everyday practice. Work is being carried out in big series, it being not at all uncommon for a licensee to accept a single contract for one series of 2000 or 3000 engines. Speeding-up is shown by the fact that one firm producing an eight-cylinder, V-type, water-cooled engine is turning them out at the rate of six per day with a staff of only 700 work people.

Undoubtedly the outstanding feature of the European development has been the great increase in the power of individual units. These are invariably of the fixed cylinder water-cooled type, with either eight or twelve cylinders. One of the best-known of these is the Renault twelve-cylinder 245-hp. engine with geared down propeller. Contrary to general plan, the French authorities have allowed a drawing of this engine to be published in a book by Lieutenant De Montgrand. From this drawing, which is reproduced herewith, it will be seen that there is a general similarity with the Mercedes aviation type: Steel cylinders with welded on sheet-steel water jackets, overhead camshaft with valves inclined in the head, two valves per cylinder, and vertical drive for camshaft, with magnetos to left and right of the vertical shaft.

Another high-powered unit is the Sunbeam, twelve-cylinder, overhead-valve, 330-hp. engine. There are in addition quite a number of engines varying from 350 to 400 hp. The largest single powerplant appears to be a twelve-cylinder, water-cooled engine which actually developed 630 hp. on the bench tests. Also, more than one of these engines is carried in a single airplane. While a lot of work has been done in this direction, there does not appear to be a very strong tendency towards multiple powerplants, the more general tendency being towards a single unit with an engine running as high as 400 hp. The handling of any twin engine plane after one of the engines has stopped is always a delicate matter for the pilot.

It has been stated in the aeronautical press that European scout machines are now showing a horizontal speed of 150 m.p.h. It is very doubtful if there is any machine anywhere in Europe capable of this high speed. A horizontal speed of 200 kilometers an hour—practically 125 miles—is possible with quite a number of different makes; but it is found a very difficult matter to increase this figure. This speed of 200 kilometers is obtained with engines of 130 to 150 hp. Thus, more than one make of plane shows a horizontal speed of better than 125 m.p.h. with the 150 hp. Hispano-Suiza, eight-cylinder engine.

Equally important with the horizontal speed is the climbing speed and the altitude at which the horizontal speed begins to decrease. The French have termed this the plafond — literally the ceiling — the highest point any machine can attain. Very much of an erroneous nature has been written on this point and altitudes have been quoted which never have been attained by any heavier-than-air machine. As a matter of comparison, the figures are given below for six European planes which, for obvious reasons, are nameless.

Plane and Engine Efficiency Differ

In considering speed at any altitude, a distinction has to be made between plane efficiency and engine efficiency. The two are often confused. It is quite possible for a plane to refuse to climb above a given height because of the diminution of engine power; with another engine, or with the same more correctly adjusted to that altitude, the plane would continue to climb. On the other hand the inefficient design of planes may prevent the machine climbing, although the power is available.

This question of the decrease of engine power with the increase of altitude has been very thoroughly investigated by European aviation engineers, engine bench tests having been carried out on high mountains with the object of securing more accurate data than is available when the machine is in the air. Some of these tests show that after the engine had been adjusted to give the best results at sea level there is a loss of 20 per cent in efficiency when operating at an altitude of 6,500 feet. Also, it was found possible to regain the whole of this loss by increased compression, greater ignition advance and carbureter adjustment.

With the increased size of powerplants, the tendency is towards higher engine speeds and geared down propellers. Thus, an engine running at 2500 revolutions, and propeller at half this speed, develops 245 hp. The same engine with direct mounted propeller develops 158 hp. at 1400, the highest number of revolutions permissible

Machine No.	HP.	Climbs 10,000 ft. in min.	sec.	Horizontal speed at 6500 ft., miles	10,000 ft., miles	13,000 ft., miles	Maximum height, feet
1	245	15	40	105	102	...	19,000
2	245	30	15	96	83	...	14,700
3	245	34	00	79	77	...	14,700
4	150	9	50	125	120	116	20,000
5	130	20	50	96	90	86	18,000
6	300	21	30	96	92	88	17,000

In cases 1, 2 and 3 the horizontal speed at 13,000 feet is not given, although the machines can attain this altitude, as shown by their maximum height.

for propeller efficiency. The weights per horsepower are respectively 2.08 and 2.2 lbs. These are not theoretical figures, but are those of engines actually in service. Considering an engine of the same design as the above, but of smaller dimensions, to produce 102 hp., the total weight with geared down propeller is 412 lbs., or 4.04 lbs. per horsepower; the same engine with direct-mounted propeller is only 71 lbs. lighter, but as the horsepower is only 62 at 1500 revolutions, the weight-horsepower ratio works out at the disadvantageous figure of 5.5 to 1.

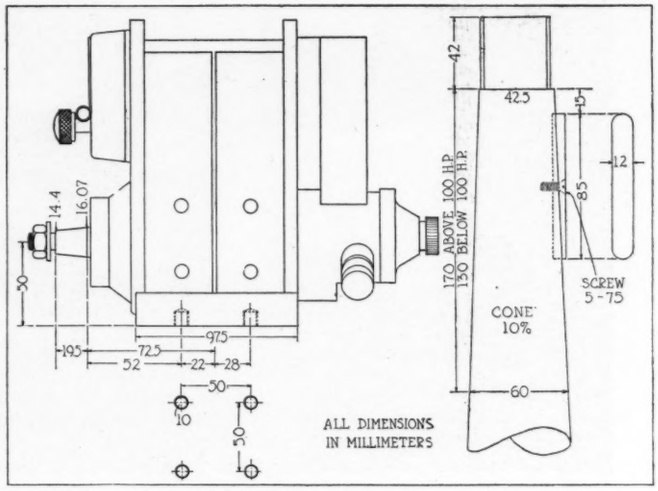
Gearing Down Engines a Problem

No small amount of trouble has been experienced in the gearing down of high-speed engines and one case could be mentioned of a very successful engine with direct-mounted propeller which develops crankshaft trouble when running at a higher speed with the screw geared down 2 to 1. In another case months were passed in experimenting and a considerable amount of money expended in endeavoring to find a cause for the failure of reducing gears to stand up to their work on a high-speed aviation engine. The defect was ultimately traced not to the gears, but to the crankshaft, which was too light, there being vibration which was transmitted to the gears to their detriment.

There are two general types of construction: Steel cylinders with welded-on, sheet-steel waterjackets, the jacket generally being common to a pair of cylinders; and the aluminum cylinder with a liner. The latter enjoys the greater favor at the present time and seems likely to outstrip the former. In both cases overhead valves are used, with an overhead camshaft driven either by a train of spur gears, or more commonly by a vertical shaft and bevels. Even with aluminum cylinders the detachable head is avoided. The tendency is decidedly towards the use of four valves per cylinder with a single camshaft for the sixteen valves of each group; in the engines developed from the Peugeot racing cars, however, there are two camshafts per group where only one existed on the car engines. The L-type twelve and eight has given way entirely before the overhead-valve engine.

Engine Design

Where powers of 300 and upwards are required, there is very much to be said in favor of the Y engine in place of twelve cylinders in V. The overall length is decreased to that of an eight of equal bore and stroke, while the height is not very much greater than that of the more conventional type twelve, for this latter generally has a very deep crankcase forming the oil reservoir, while the Y engine carries no oil in the crankchamber. Engines of this type have been built with satisfactory results, the crankshaft being carried in ball bearings and all the oil maintained in a separate tank apart from the engine. The Sunbeam company has taken out patents for an eighteen-cylinder engine with six vertical cylinders and two groups of six inclined in relation to the central group.



Left S. E. V. magneto adopted by France for aviation. It is of Bosch type, and the base and coupling are standardized so that they are interchangeable. At the right is the standard propeller mounting

While there have been fewer developments in the rotary-type, air-cooled engine, it has not by any means disappeared, nor is it likely to do so. Its use, however, is confined to powers not exceeding 130 or 140 hp. For the fast scout machines not required to keep aloft for more than two or three hours at any one time, it has an advantage over any water-cooled engine within the powers mentioned. Another advantage, too, is its ability to operate in any position, and as the single-seater scout machines are designed to perform all kinds of acrobatics, to loop the loop at the will of the pilot, and to perform long vertcial corkscrew dives, it is practically supreme for this class of machine.

Electric starting is not often adopted on European airplane engines owing to the excessive weight of the storage batteries necessary to spin an engine of big size. The general practice is to fit a starting magneto, and while this entails hand cranking it simplifies the task sufficiently to make starting possible in the air in cases where it would be impossible without this device. It is becoming more common to fit engine-driven electric generators for lighting purposes, these taking the place of the wind-driven generators employed some time ago. Power-driven pumps are necessary to maintain pressure on the gasoline supply to the carbureter.

The efficiency of an airplane engine can be studied by the formula:

H.P. per cubic inch piston displacement = Efficiency.
Weight per Horsepower

According to this formula, an efficiency of .175 has been obtained with one of the latest and best engines produced in Europe. The data concerning this engine is as follows:

	Cu. in.
Piston displacement	1156
Horsepower	390
Weight per horsepower	1.92
Horsepower per cubic inch piston disp.	.337
Efficiency	.175

This is a twelve-cylinder engine developing its full power at 2500 revolutions, with a propeller running at half engine speed. A smaller engine, also with geared down propeller, gives the following:

	Cu. in.
Piston displacement	763
Horsepower	245
Weight per horsepower	2.15
Horsepower per cubic inch piston disp.	.321
Efficiency	.149

A third and very successful aluminum eight-cylinder engine, with direct mounted propeller, gives the following:

	Cu. in.
Piston displacement	707
Horsepower	150
Weight per horsepower	2.42
Horsepower per cubic inch piston disp.	.233
Efficiency	.096

In arriving at these figures weight has been considered with engine complete, but without water, fuel, or oil.

IOWA THEN AND NOW

Des Moines, Iowa, Aug. 11—Eleven years ago Iowa, the home of motor car owners, was so hostile to motor cars that it wanted them kept from the public highways. To-day there is one car for every ten persons in the state.

It was just eleven years ago that residents of Denison, Iowa, met in solemn session and passed resolutions warning owners to keep their cars off the roads. An article printed in a Denison newspaper July 26, 1906, had the following heading: "Autos 'In Bad' at Denison." The article relates that the seventy-five citizens in attendance were willing to give car owners a reasonable time within which to dispose of their cars. E. C. Chamberlin, a Denison merchant and car owner, defended the then-innovation, but in spite of his plea for the "horseless carriage" the meeting adopted the following resolutions:

"We the undersigned request that the owners of autos keep them off the public highways, as they are a detriment to both town and country and constantly endangering the lives of the public. It seems that the wish of many should be respected by the few."

One of the anti-motor car men at the meeting suggested that a man with a good rawhide whip and not afraid to use it could take any horse past any car. This remark started some argument and discussion and he was asked, "How about the women and children?" He replied that he had none yet.

A. B. C. of Aviation

Nomenclature for Aeronautics

FOR the information of those interested in aeronautics the following nomenclature has been prepared as a guide, with a view to elminating the duplication of terms, the erroneous use of terms and confusion of terms, and with a view to defining the principal terms which have come into use in the development of aeronautics. In the preparation of this nomenclature only those terms which are new and peculiar to this subject have been defined. It is taken from the report of the National Advisory Committee for Aeronautics.

AEROFOIL—A thin wing-like structure, flat or curved, designed to obtain reaction upon its surfaces from the air through which it moves.

AEROPLANES—See airplane.

AILERON—A movable auxiliary surface used for the control of rolling motion, that is, rotation about the fore and aft axis.

AIRCRAFT—Any form of craft designed for the navigation of the air—airplanes, balloons, dirigibles, helicopters, kites, kite-balloons, ornithopters, gliders, etc.

AIRPLANE—A form of aircraft heavier than air which has wing surfaces for sustentation, with stabilizing surfaces, rudders for steering, and powerplant for propulsion through the air. The landing gear may be suited for either land or water use.

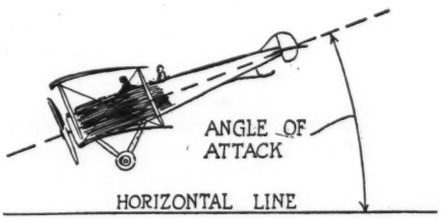
Pusher—A type of airplane with the propeller, or propellers, in rear of the wings.

Tractor—A type of airplane with the propeller, or propellers, in front of the wings.

AIR-SPEED METER—An instrument designed to measure the velocity of an aircraft with reference to the air through which it is moving.

ALTIMETER—An instrument mounted on an aircraft to indicate continuously its height above the surface of the earth.

ANEMOMETER—An instrument for measuring the velocity of the wind or air currents with reference to the earth or some fixed body.



ANGLE:

Of attack—The angle between the direction of the relative wind and the chord of an aerofoil, or the fore and aft axis of a body.

Critical—The angle of attack at which the lift is a maximum.

Gliding—The angle the flight path makes with the horizontal when flying in still air under the influence of gravity alone.

ASPECT RATIO—The ratio of spread to chord of an aerofoil.

AXES OF AN AIRCRAFT—Three fixed lines of reference, usually centroidal and mutually rectangular.

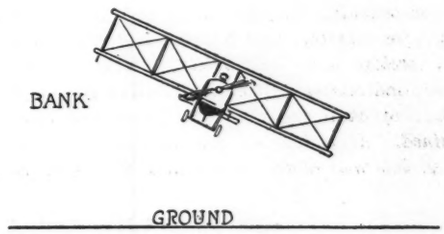
The principal longitudinal axis in the plane of symmetry, usually parallel to the axis of the propeller, is called the fore and aft axis, or longitudinal axis; the axis perpendicular to this in the plane of symmetry is called the vertical axis; and the third axis, perpendicular to the other two, is called the athwartship axis, or transverse or lateral axis. In mathematical discussions the first of these axes is called the X axis, the second the Z axis, and the third the Y axis.

BALLONET—A small balloon within the interior of a balloon or dirigible to control the ascent or descent and maintain pressure on the outer envelope to prevent deformation. The ballonet is kept inflated with air at the required pressure, under the control of a blower and valves.

BALLOON—A form of aircraft comprising a gas bag and a car, whose sustentation depends on the buoyancy of the contained gas, which is lighter than air.

Captive—A balloon restrained from free flight by a cable attaching it to the earth.

Kite—An elongated form of captive balloon, fitted with tail appendages to keep it headed into the wind and deriving increased lift due to its axis being inclined to the wind.



BANK—To incline an airplane laterally, that is, to rotate it about the fore and aft axis. Right bank is to incline the airplane with the right wing down.

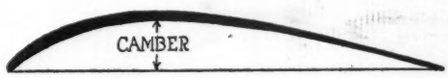
BANKING RUDDER—See Aileron.

BAROGRAPH—An instrument used to record variations in barometric pressure. In aeronautics the charts on which the records are made are prepared to indicate altitudes directly instead of barometric pressure.

BIPLANE—A form of airplane in which the main supporting surface is divided into two parts, one above the other.

BODY OF AN AIRPLANE—A structure, usually inclosed, which contains in a stream-line housing the powerplant, fuel, passengers, etc.

CABRE—A flying attitude in which the angle of attack is greater than normal; tail down; down by the stern—tail low.



CAMBER—The convexity or rise of a curve of an aerofoil from its chord, usually expressed as the ratio of the maximum departure of the curve from the chord as a fraction thereof. "Top Camber" refers to the top surface of an aerofoil, and "Bottom Camber" to the bottom surface; "Mean Camber" is the mean of these two.

CAPACITY:

Lifting—The maximum flying load of an aircraft.

Carrying—Excess of the lifting capacity over the dead load of an aircraft, which latter includes structure, powerplant and essential accessories.

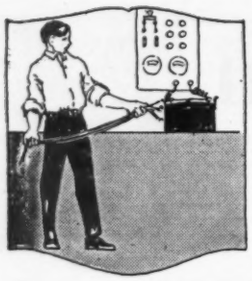
CARRYING CAPACITY—See Capacity.

CENTER—The point in which a set of effects is assumed to be accumulated, producing the same effect as if all were concentrated at this point:

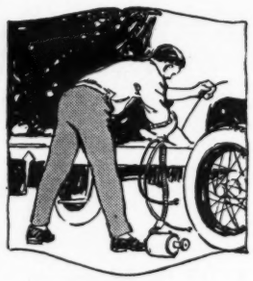
Of buoyancy—The center of gravity of the fluid displaced by the floating body.

Of pressure of an aerofoil—The point on the chord of an element, prolonged if necessary, through which at any instant the line of action of the resultant air force passes.

Of pressure of a body—The point on the axis of a body, prolonged if necessary, through which at any instant the line of action of the resultant air force passes.



Electrical Equipment of the Motor Car



By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the fifty-sixth installment of a weekly series of articles begun in MOTOR AGE *issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., in a size to fit the pocket conveniently.*

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout. Electric motors and engine and motor connections then were considered.

Part LVI—High- and Low-Tension Magnetos

THE low-tension magneto, as its name indicates, is one in which an electrical pressure of relatively low value is produced when the armature of the magneto is driven at ordinary, or working, speed. The winding of this type of magneto consists of a single coil of rather large wire, something like a No. 18 Bands-gage. The volume of current such a magneto is capable of supplying is, of course, greater than the current a high-tension type can supply, but this current is supplied at a relatively low voltage, so that the actual output of the two types of magneto may be practically the same. The low-tension magneto is used with the make-and-break system of ignition, its winding being connected directly in series with the ignitor points and, perhaps, an inductive coil, sometimes called a kick coil, which intensifies the spark.

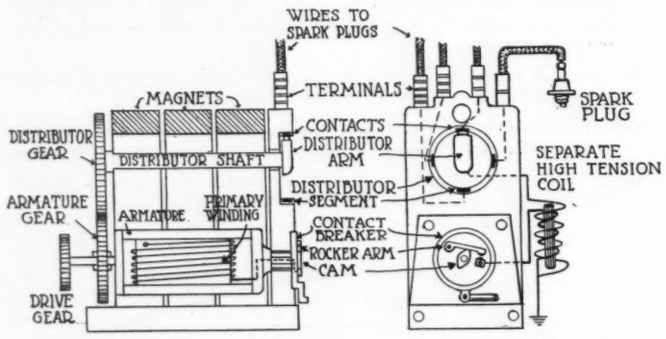


Fig. 310—Application of low-tension magneto, in which a high-tension distributor is used

Since the electrical pressure generated in the winding of the low-tension magneto is so low, it is impossible to use such a magneto with jump-spark ignition systems without increasing the voltage by an induction coil. Magnetos of the low-tension type then always are used with all induction, just as the battery is combined with the induction coil, when they are used in supplying current for jump-spark systems of ignition.

The application of the low-tension magneto is shown diagrammatically in Fig. 310. A sectional view of a low-tension magneto is shown in Fig. 311. Each of the most important parts is given its proper name.

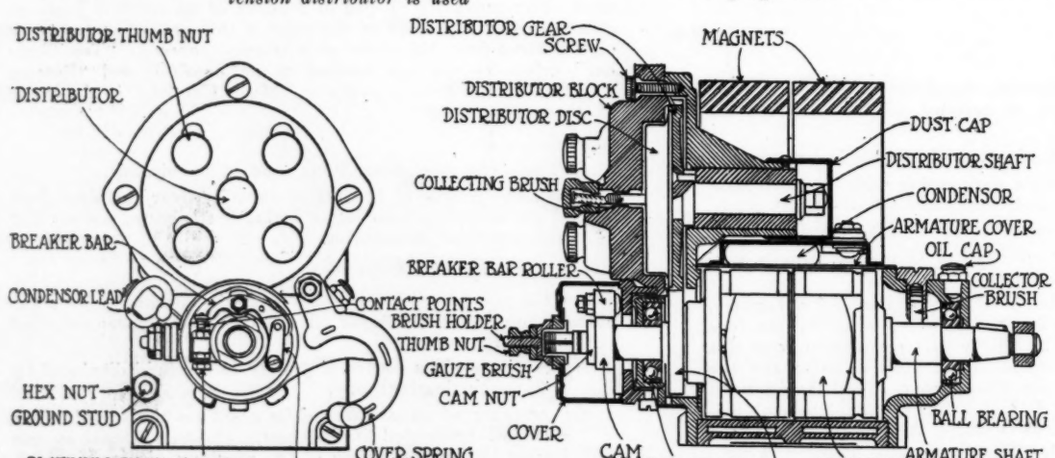


Fig. 311—Cross-section of Splitdorf low-tension magneto, with each important part given its proper name

The purpose of the high-tension distributor shown in Fig. 310 and 311 is to distribute the high-tension current from the high-tension coil, shown at the right of Fig. 310, to various spark plugs when the interrupter breaks the primary circuit of the coil, which includes the winding of the magneto. The distributor brush should be making contact with or directly opposite one of the segements connected to the spark plug wire terminals when the primary circuit of the high-tension coil is broken. The distributor usually is

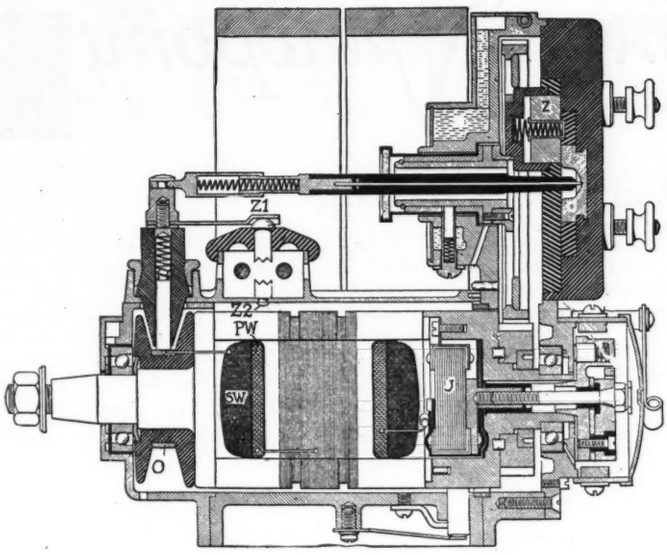


Fig. 312—Longitudinal cross-section through typical high-tension magneto, parallel to armature shaft

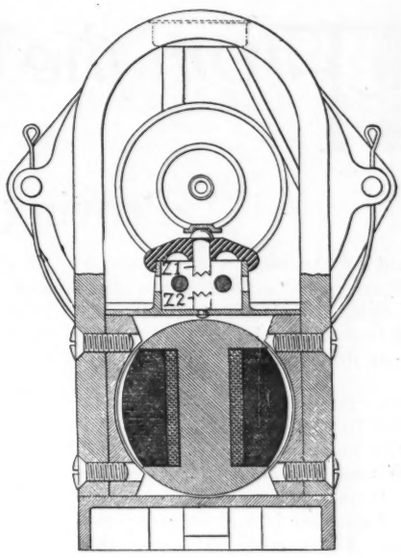


Fig. 313—Cross-section of typical high-tension magneto perpendicular to the armature shaft

mounted on the magneto and geared to the armature shaft in order that the position of the distributor arm and the cam, relative to each other in their respective cycles of operation, be practically the same, except for the advancing or retarding of the spark.

As the cam on the end of the armature shaft shown in Fig. 311 rotates, it raises the interrupter, or breaker arm, A, twice each revolution, and this causes the primary circuit of the high-tension coil to be opened suddenly, which results in a high electrical pressure being induced in the secondary winding, provided the break in the primary circuit occurs when the armature is in such a position as to have a rather high electrical pressure induced in its winding. In a four-cylinder, four-cycle engine, four sparks are required every two revolutions of the engine crank; hence, the distributor will be driven at half the speed of the engine crank. Since only two sparks are possible with this type of magneto for each revolution of the armature, it is necessary to drive the armature at twice the speed of the distributor, or at engine speed. In a six-cylinder engine, the distributor shaft revolves at half the engine speed, and the armature shaft at one and one-half engine speed in order that the required six sparks be produced for each two revolutions of the engine crank.

High Tension Magneto

The high-tension magneto differs from the low-tension magneto in only a few particulars. The armature on the high-tension magneto is so wound that a high-tension current may be obtained from it without the use of a separate induction or high-tension coil. In some types, this high-tension current is produced in an armature winding of many more turns than is provided in the ordinary low-tension magneto, while in other types a second winding is placed around the first, which serves the same purpose as the secondary winding of the high-tension coil. This secondary winding is insulated carefully from the primary winding, except at one end, where both it and the primary winding are grounded. A cross-section of a typical high tension magneto is shown in Fig. 313. PW is the primary winding, and SW is the secondary winding. The insulated end of the secondary winding is insulated carefully and connected to a metal collector ring, O, mounted on the armature shaft, and a small carbon brush resting on this collector ring, takes off the secondary current and leads it to the distributor brush, Z. A cross section perpendicular to the armature shaft is shown in Fig. 313. A simplified diagram of the circuits of a high-tension magneto is shown in Fig. 314. The two metal points of the contact breaker normally are in contact. As the cam rotates one end of the bell crank comes into contact with an extension on the cam, which causes the bell crank to rotate, and, as a result, the two contacts are separated momentarily. The primary circuit thus is opened and closed as many times for each revolution of the cam as there are projections on the cam.

When the primary circuit is opened suddenly, an action will be taking place in the secondary winding, very similar to that taking place in the ordinary high-tension coil. At the same time there is a change in the magnetic lines of force through the secondary winding, due to a change of current in the number of magnetic lines, which, in turn, is due to the rotation of the armature in the magnetic field, which serves to increase the action taking place in the secondary winding.

The purpose of the condenser, J, in Fig. 312 is to cause the current in the primary winding to decrease in value in a shorter time when the primary circuit is opened than it would otherwise, and at the same time to reduce greatly the amount of arcing at the breaker contact points. In some types of magnetos this condenser is mounted inside the magneto armature, while in other types it is outside the armature.

Safety Gap

A device called a safety gap is provided on high-tension magnetos, whose function is somewhat similar to a safety valve. If, for example, one of the high-tension leads from the distributor to the spark plugs should become detached so that the path through which the high-tension current ordinarily would flow would be open, then a very high voltage would be acting on the insulation and the insulation might be damaged seriously unless some easier path be provided for it to escape through. A magneto, of course, must be capable of generating a hot spark at slow engine speeds, and this results in a very high voltage spark being produced at high engine speeds.

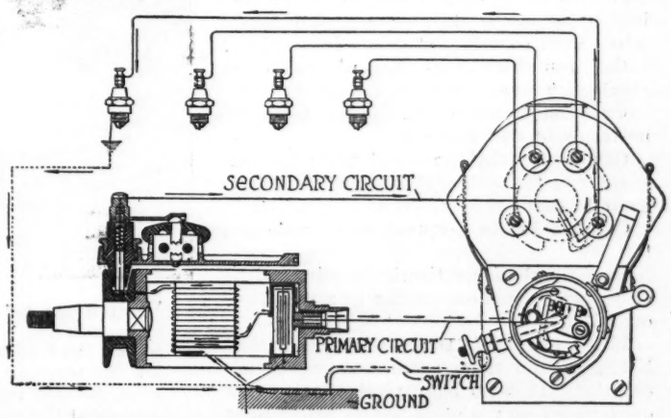


Fig. 314—Simplified diagram of the circuits of a high-tension magneto

From the Woman's Viewpoint

Proving Their Case by Driving

IN the light of the records made in the recent Liberty Bond contest of the Maxwell Motor Sales Corp. of Detroit it must be admitted that women have proved their case—they can drive a motor car and drive it well.

Contestants from twenty-eight states were enrolled in the runs and when the records of the women were compared with those of the men, the comparison was no discredit to them. Their average mileage on a gallon of gasoline is a great argument for their case. The average mileage of the women who took part was 29.08 miles, while the average mileage of all contestants was slightly lower, 29.04.

Though Arizona stands first in the mileage list, with a general average for all its contestants of 39.1 miles, women made the most mileage in Kentucky. There the average for the women who contested was 42.2 miles. The women of Georgia made the lowest average, 20.1 miles, though it was in Georgia that the most mileage obtained by any of the participants was made. A man drove his car 51.9 miles.

In the majority of the states having women among its drivers in the contest the average mileage for a gallon was well above 25 miles. The average mileage of the women and the states in which they participated in the gasoline economy runs are:

California, 32.4; Connecticut, 27.05; District of Columbia, 25.8; Florida, 29.9; Georgia, 20.1; Idaho, 30.5; Illinois, 32.1; Indiana, 28.8; Iowa, 25.4; Kansas, 26.1; Kentucky, 42.2; Louisiana, 27.1; Maryland, 33; Massachusetts, 29.3; Michigan, 28.2; Minnesota, 23.3; Nebraska, 27.3; New Jersey, 32.1; New York, 28.1; Ohio, 28.4; Oklahoma, 29.8; Pennsylvania, 28.4; Texas, 34.3; Utah, 30.5; Washington, 30.05; West Virginia, 21.3, and Wisconsin, 27.6.

Can You Do This?

Anita King, she of movie fame and also she who obtained much of the first of that fame by a well-advertised transcontinental tour in a motor car, would put the following questions to all women who would prove their case in motor car driving:

Can you shift gears in a whisper when climbing a steep hill without slowing up?

Can you locate a foul spark plug, remove, clean and space it?

Can you tell by the sound when the carbureter is too rich and change the adjustment to correct?

Can you locate a squeak or a rattle and kill it?

Can you change a tire in 10 min. and be on your way without calling in a wearer of overalls?

If you cannot do these things, says Miss King, and do them without dread or uncertainty, then go back to the instruction department of the place where you bought your car and make them stick with you until you have learned these things. Then, and not until then, will you have approached the point where transcontinental travel at the wheel of a motor car will become a real joy.

Do Your Food Best

America has not yet reached the limit of high prices, even though the thrifty housewife holds up her hands in holy horror at the market quotations of the middleman. Cabled press advices from Austria indicate that lunch cannot be purchased in any restaurant for less than $5—3 lb. of meat, $5; olive oil, $10 a quart; butter, $5 a pound, and chickens, $10 each.

But America must conserve her food, and there is no one food that should be conserved more than wheat. Instead of wheat the food administration is urging corn, and a more than bumper corn crop seconds that urging. Many object to the use of corn through ignorance of its proper preparation. Part of the country at least needs to be educated in the preparation of corn, and the government already has made extensive efforts toward this.

Women are aero mechanics on the French front. So great is the need for all the help that can be obtained on the western front, women have been pressed into service as mechanicians at the aviation sections. Two are shown here in a French camp

Corn may be used in place of many foods which are dependent on wheat or some food of like exporting value. For instance, it may be used with cheese in place of macaroni, and the resulting dish will be both delicious and nutritive. The following recipe has been worked out by specialists in the United States' service:

1 cup samp (coarsely ground or cracked corn).
1 qt. water.
1¼ tsp. salt.

Boil the samp in the salted water until tender. Drain and combine with this sauce:

1 cup skim milk.
1 cup finely cut cheese.
2 tbsp. flour.
1 tsp. salt .
¼ tsp. mustard, paprika or other seasoning.

Mix the seasonings with the dry flour. Add enough milk to form into a smooth paste. Add the remainder of the milk and heat in a stewpan, stirring constantly until thick. Add the cheese and stir until it is melted thoroughly.

Put a layer of the boiled samp in a baking dish or casserole. Add a layer of sauce, and so on, alternately until the material is all used. Sprinkle bread crumbs over the top layer of sauce and cook in a medium oven until the crumbs brown.

Lye hominy, or hulled corn, may be used in place of the coarse corn. If this is used it is unnecessary to heat it until it is placed in the oven.

A richer sauce may be made thus:

2 tsp. butter.
2 tbsp. flour.
1 cup milk.
1 cup finely cut cheese.
1 tsp. salt.
¼ tsp. mustard, pepper or paprika.

Melt the butter in a sauce pan. Mix into it the flour and seasonings. Add the milk and heat, stirring constantly until the sauce becomes thick and smooth. Add the cheese and stir until it is melted.

With British Women

The feminine section of the British field army grows larger all the time. Khaki-clad women, at first with the Red Cross only, are entering other departments of the field army, to displace men for work nearer the front line trenches. They are employed by hundreds as chauffeurs, not only for ambulances and light supply wagons but also for heavy trucks. They are very successful in the work. Each wears a uniform of regulation khaki, short skirt and knickers. A badge on the sleeve further identifies her as one of the British in the field army. Young women lieutenants command, and each unit has its own supervisory officers and chaperons.

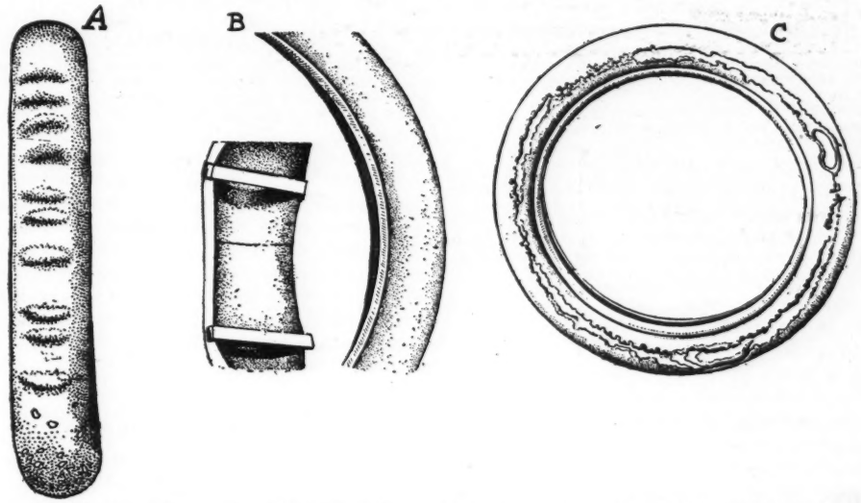
Every boat going to France from England takes new companies of woman workers. At first their work was mostly at the remote bases, but now they may be found within hearing distance of the guns.

The Motor Car Repair Shop

How to Oil Your Car's Springs

AT best the process of applying graphite, grease or oil to the springs of a car is a messy piece of work and one that requires a good deal of time, if a good job is wanted. The usual process consists of spreading the spring leaves apart with spreaders and applying the lubricant between the leaves with a putty knife, stick or some similar thing. This is, of course, the best way to do the work and assures the car owner that the lubricant is actually between the leaves where it will do the most amount of good. Most motorists are aware of the fact that the car springs need oiling in order to secure the maximum amount of driving and riding comfort, but they are loth to tackle the job, even while realizing the necessity of it.

The thing to do in a case of this kind, although not the best way, is to oil the springs in the following way, without spreading the leaves apart. The car owner provides himself with a small amount of gasoline, kerosene and oil, all of which can usually be found in every garage. The first thing to do is to clean the outside surfaces of the spring leaves thoroughly. If they are covered with mud, wash them with soap and water, after which go over them with a rag that has been soaked in gasoline. Use a stiff brush if possible, on the edges of the spring, and see that all the dirt gets out of the crevices. Now with an old paint brush or rag, apply the kerosene to the springs, putting on a liberal amount. Let the car stand in this way for a few minutes and you will find that the kerosene has worked its way through the springs. The only remaining thing to do consists of applying oil to the springs at intervals and allowing it to creep between the leaves. The function of the kerosene consists of paving the way for the oil, that is, the kerosene, by capillary attraction, will pull the oil through the springs the same as though they were spread apart and the oil applied with a can to the surfaces. Obviously if the springs have become badly rusted, this method will not be very effective. In such a case, the only thing to do is to open the leaves with a tool provided for the purpose or a chisel.



At A is shown the result of underinflation, while B is a surface, or gum, blowout caused by a slow leak. Running in ruts will affect a tire as shown by C

In connection with the oiling of springs might be mentioned that cars which are not equipped with shock absorbers can sometimes be made to ride much easier by thoroughly oiling the springs first and wrapping them with heavy fish cord. The latter should be wound evenly and very tight. When the springs are wound, adhesive tape is wrapped over the fishline, from near the center of the spring, out to the ends. The theory back of this procedure is that violent spring action will be dampened out to a certain extent by the fishline, thus adding materially to the car's riding qualities. Also by thus wrapping the springs, the lubricant will remain between the leaves and dirt and water are kept out. Cars which have been fixed up in this way have been known to go for two seasons without any attention to the springs. This method seems to give especially good satisfaction when applied to Ford cars.

Keep Your Tires Inflated

UNDER-inflation is the white plague of the pneumatic tire. More damage, such as shown at A is done, possibly, by under-inflation than by any other cause. The wavy condition of the tread of this tire is due to its having been run soft, with insufficient air, and consequently becoming loose from the fabric through no fault of manufacture. Most tire manufacturers have inflation schedules which they are very anxious to place in the hands of every motorist.

The tire shown at B has been a victim of a slow leak which caused a surface or gum blow-out. Very frequently slow leaks are caused by picking up loose nails or tacks. The head of the nail or tack prevents the air from coming out of the casing at the punctured spot, but not so of the tube. Possibly before the slow leak is noticed the head of the nail or tack has been worn off so that it cannot be located from the outside. This happens every day and generally the motorist will put several tubes in the casing with the result that they are punctured by the concealed nail or tack. Take the precaution, always in changing a tire, to run your hand carefully around the inside of the casing in search of these sharp objects which puncture your tubes. This casing was originally punctured in the center of its tread. While, usually, the air would escape through the puncture, in this case it has followed the fabric plies and come out between the outer ply and the rubber tread. In seeking the point of least resistance it has accumulated where the rubber was thinnest and formed an air pocket. The thin rubber soon gave way to a blow-out. This casing could have been easily repaired. A new tube should have been put in the casing and at the earliest opportunity the loose rubber should have been vulcanized to the carcass of the casing where it had become loose.

At C is shown a tire that has been run in ruts. Whether the ruts in the road are too large or too small for the tire, this wear on the sidewalls occurs regardless. What's the answer? Keep out of the ruts. Tires were not made to withstand wear of this kind.—B. F. Goodrich Rubber Co., Akron, Ohio.

TRACTOR PLANT FOR TEXAS

Texarkana, Tex., Aug. 11—A plant for the manufacture of farm tractors and motor trucks will be constructed here soon by a syndicate of Quincy, Ill., men. The initial plant, it is announced by G. M. Stone, who is at the head of the syndicate, will cost approximately $100,000. The site already has been purchased, and erection of the buildings will be started soon. Associated with Mr. Stone are H. C. Lloyd, W. T. Brady and J. L. Fulton. Mr. Fulton is mechanical engineer.

ELGIN TOURS HIGHWAYS

Chicago, Aug. 10—An Elgin six is making a tour of the Lincoln highway, the San Francisco-Los Angeles road, the National Old Trails road and the Dixie highway. Road information will be gathered.

The Readers' Clearing House

FIGURING HORSEPOWER OF ENGINE

Piston Displacement and How It Is Determined

CHICAGO—Editor MOTOR AGE—How can I figure out the horsepower for a given gasoline engine, knowing bore and stroke?

2—What is meant by piston displacement, and how is it determined?

3—What is "road clearance"?

4—What is a "balanced crankshaft"?—George Stevens.

1—The S. A. E. formula for finding the horsepower of an engine when the bore and stroke are known is stated as follows:

$$\text{Horsepower equals } \frac{D^2N}{2.5} \text{ at a piston speed}$$

of 1000 ft. per minute, where:

D is the diameter of the cylinder bore in inches.

N is the number of cylinders, and

2.5 is a constant divisor.

For example, if the engine has a bore and stroke of 4 and 5 in. respectively, you multiply the 4 by itself and then by the number of cylinders the engine has and divide the result by 2.5. If the engine has four cylinders the horsepower of the engine will be 20.4.

2—Piston displacement means the volume of gas displaced in the cylinders by the pistons in their movement from the upper to the lower point of their stroke. The piston displacement of any one cylinder is equal to the volume of a cylinder whose diameter is the bore and whose height is the length of the stroke. The piston displacement in cubic inches is found by multiplying the cylinder bore in inches by itself and then by .7854 and then by the stroke in inches. If the product thus found be multiplied by the number of cylinders the engine has, the result will be the piston displacement of the engine.

3—Road clearance simply means the vertical distance from the ground to the lowest part of a car. This may be the crankcase, differential housing, axles, etc. A car with 12 in. road clearance would, for instance, be safe in passing over an obstruction that was not over 12 in. high.

4—A balanced crankshaft is one that is provided with counterweights extending from it radially in the opposite direction of the crank arms and so proportioned that if the crankshaft is placed on a pair of supports at the ends, it will remain in any position in which it is placed.

Laying Out a Public Garage

Indianapolis, Ind.—Editor MOTOR AGE—I am planning a public garage. Is there any average allowance of the number of square feet for cars made? If so, give the figures.—Leo K. Fesler.

You should allow 175 sq. ft. per car, but this is not the way to go about building a garage, as the number of square feet depends on the layout. You would make a grave mistake if you built your building before you decide upon the best way to arrange the cars. A car requires space 7 ft. wide and the length of the car varies from 13 to 20 ft.—the average being about 15 to 17. The Ford is about 13 or 13½ ft. long.

Two More Extreme Types

Two additional suggestions for the motorists who want the extreme in the car body line, designed by a Motor Age artist, are shown below. The low-hung roadster shown on the left, in addition to its general out-of-the-ordinary appearance, abounds in little novelties not usually found in the conventional car. For one thing, the steps which give access to the rear seating compartment should be noted. These are placed between the body and fender on the right side. The rear seating compartment can be covered if desired, making the car a two-passenger.

At the right is shown a four-passenger car having a very long wheelbase and novel seating arrangement. The latter consists of wicker chairs which can be placed in any position that might strike the fancy of the occupants. In this respect the car is much like the cockpit of a high-priced motor boat. The steering wheel is set at right angles to the car frame in much the same manner as that of a power boat. Hence, the driver of this car might be fully justified in referring to his mount as a boat. Both cars shown carry the gasoline in tanks placed in the rear with the filler necks arranged so that replenishing the fuel is a matter of little trouble.

WHY CAMBER THE FRONT WHEELS

Not Practical to Do This to Rear Part of Motor Car

Manitowoc, Wis.—Editor MOTOR AGE—What causes a machine to "lope" when getting too rich a mixture?"

2—Does tar injure tires? Why?

3—The valve stems in L-head motors get little or no oil. Why don't they seize?

4—Why are spiral gears used in place of straight cut?

5—Why aren't the rear wheels "dished" like the front ones—both skid?

6—Why does it make for easier steering to have this front wheel inclined?—Walter C. Olp.

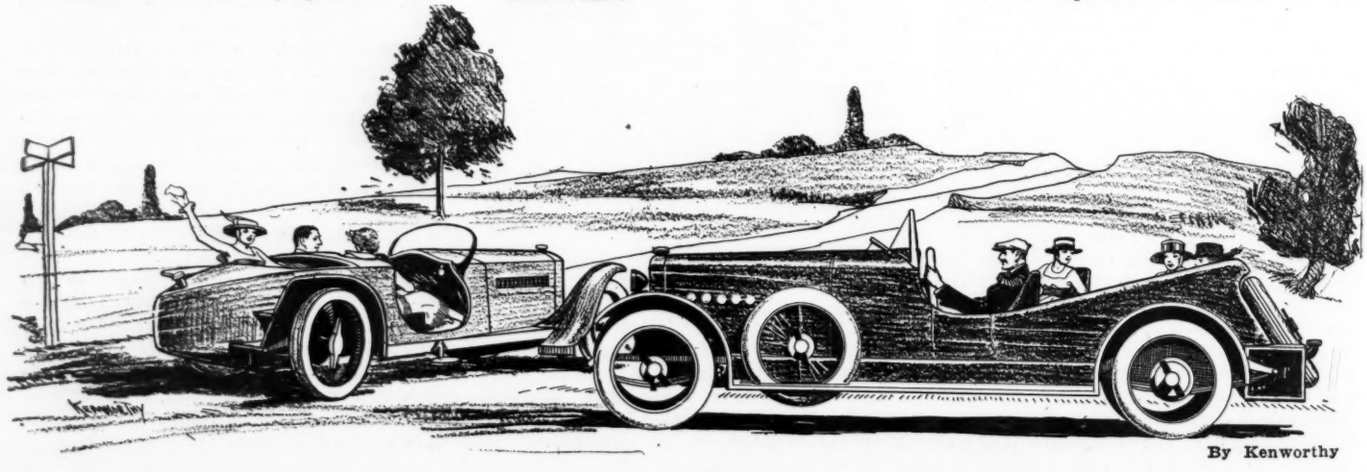
1—There are many things that might cause an engine to lope when the mixture is too rich. It may be due to the construction of the intake manifold in which the condensation of the gases is such that some of the cylinders are overburdened, while others can take care of the inriched mixture, and fire it properly. It depends to some extent on the conditions of the plugs, for a plug that does not fire regularly will sometimes cause an engine to lope. In fact, an engine that misses through improper plugs, valves, etc., is apt to run in this way, especially if the mixture is on the rich side.

2—You probably refer to the black substance or oil generally applied to the surface of country roads. Any oil is injurious to tires for it is a solvent or softener of rubber. After running over oiled roads it is a good plan to wash off the tires with gasoline, the latter evaporating so rapidly that no harm is done to the tires.

3—The valve stems are not subjected to the same heat as the pistons, for instance, and travel only half as fast. Where they are inclosed by cover plates, some of the oil of the crankcase is often forced up through the push rod guides and the oily mist finds its way to the valve stems, giving them some lubrication. This is true on some engines. On other engines, especially those that have been run a great deal, the stems fit rather loose in their guides and do not seize owing to the great clearance. When valves are reground it is a good plan to smear some graphite on the stems before replacing them, to prevent wear and afford lubrication.

4—They run much more quietly.

5—It is impossible to camber the rear



By Kenworthy

wheels of a car, because the latter are mounted on the axle shafts and obviously the shafts could not be inclined to accommodate the wheels and yet provide for an easy installation of the differential. It would require universal joints and various other fittings to do this, all of which would complicate the parts and absorb power from the engine, which should go to the road wheels.

6—If the front wheels were set on a perfectly vertical line, that is, if the steering spindle were horizontal as shown in Fig. 1 at the left, the vertical stress would be along the line AB. To obtain the greatest strength, the line of action should be along the line CD. In order to accomplish this, the wheels are cambered as shown at the right, which brings the stress along the line EF. Not only is the load then carried properly, but the point where the wheel rests on the ground is brought more nearly under the steering spindle, which makes for easier steering and at the same time reduces the strain on the steering mechanism.

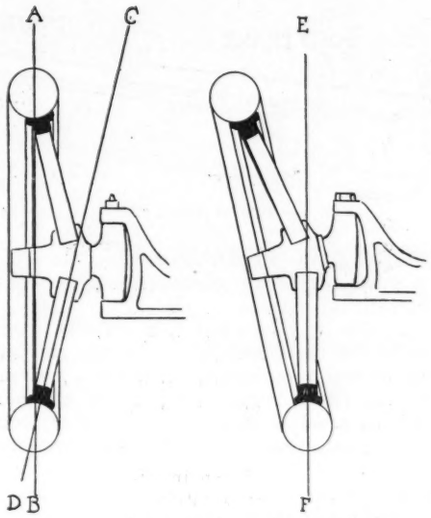


Fig. 1—To illustrate cambering wheels for greatest strength

Storage Battery for Starting

El Paso, Tex.—Editor MOTOR AGE—I have an Oldsmobile 1909 model D, no starter, Bosch high-tension magneto and coil. I have a Willard 6-120 battery for lights. Can I connect battery and use it for cranking motor instead of cranking on magneto? Bosch service man says I can, others say it will burn out my coil.—J. J. Wagner.

You probably could use the battery all right in the way you mention, but it seems to us that the coil will be affected sooner or later. However, if the service man tells you it can be done and if he has seen your outfit, you would probably be safe in making the change.

Beaume Tests of Gasoline

Jonesboro, Ark.—Editor MOTOR AGE—Does a Beaume test indicate the quality of gasoline as a fuel for automobiles, and what relation does it bear to the boiling point?

2—If two samples of gasoline tests the same Beaume, does that indicate they are of the same quality?

3—At what temperature should 60 test gasoline flash, and what should its boiling point be?

4—Will all of a given sample of gasoline boil away at the same temperature, or will the last part of it have to be heated to a higher temperature than the first part?—H. C. Wright.

1—No.

2—No.

3—This depends upon the source of the crude and a distillation of the particular sample is the only way to get this information.

4—It will not all vaporize at the same temperature and the last part will have to be subjected to a greater heat.

1913 American Scout as Speedster

Amarillo, Tex.—Editor MOTOR AGE—Publish a sketch of a 1913 model American Scout roadster with rear end of body changed to a more modern appearance, doing away with the clumsy old fenders.

2—What firm would remodel it?

3—What changes would you suggest in converting the above roadster into a racing car?—I. R. Kerley.

1—A suggestion for this appeared in this department of MOTOR AGE, issue of May 30.

2—Probably the cheapest way out of it for you would be to have it built by some one in your vicinity. There are, of course concerns which make a specialty of doing this kind of work, but the cost of shipping your car, etc., to these places would in most cases be prohibitive.

3—Better not attempt to make a racing car out of this outfit, as the underslung features have certain drawbacks when cars of this type are used for speed work. However, if you want it for a fast road car, you can change the gear ratio, fit larger valves, install a larger carbureter and shorter intake pipe. The timing of the magneto can also be set ahead slightly. The engine would then not idle quite so well, but you could use the battery system for this and switch over to the magneto after a certain speed has been reached.

Inquiries Received and Communications Answered

George Stevens	Chicago
Leo K. Fesler	Indianapolis, Ind.
Walter C. Olp	Manitowoc, Wis.
J. J. Wagner	El Paso, Tex.
H. C. Wright	Jonesboro, Ark.
I. R. Kerley	Amarillo, Tex.
Joseph Gilbert	Dayton, Ohio
A. D. Lewis	Buffalo, N. Y.
Chester M. Armour	Beebe, Wash.
H. Clay Latham	Hillsboro, Ill.
E. G. Davis	Helena Station, Ky.
Rolly Blais	Surprise, Neb.
William Spahn	Jersey City, N. Y.
George H. Weber	Divernon, Ill.
N. L. Hierbach	Milwaukee, Wis.
William Roberts	Wallingford, Ky.
T. T. Beynon	San Antonio, Tex.
E. O. Day	Victor, Col.

Cannot Start on Magneto

Freeport, Ill.—Editor MOTOR AGE—Recently I had a new 1917 magneto and coils complete installed in my car. After driving less than 100 miles the car stopped suddenly and I could not get it started on the magneto. I looked at the primary contact, thinking there might be some dirt on the points, but found it O. K. I then connected up four dry cells and started the car, after which I switched onto the magneto and the car ran as well as ever. Later the car refused to run on the magneto, after starting on the batteries and upon taking out the primary contact, I found a cotter pin lodged there. After removing same the car would operate as before, starting on batteries, then switching to the magneto.—Louis Hamilton.

1—It seems very likely that when the car stopped suddenly some part of the magneto mechanism went out of order and interrupted the flow of electricity. This might account for the presence of the cotter pin. Better examine the details of the contact breaker box and see if the points are in perfect order and have the proper amount of opening. Look also to the switch grounding wire and the switch itself for loose or improper connections. Inasmuch as you do not state what make of instrument you have, it is hard for us to give you definite information.

Shorter Manifold May Help

Dayton, Ohio—Editor MOTOR AGE—I have a new Stromberg carbureter on my Overland model R. 69. It is O. K. except that when speeding up it will missfire for a while until a certain amount of gas power is consumed that is in the long carbureter intake manifold. I have a hot air attachment on the carbureter and have adjusted it every day. What can I do to eliminate this skip on opening of the throttle?—Joseph Gilbert.

We suggest that you fit a shorter intake manifold.

Converting Stutz Into Speedster

Buffalo, N. Y.—Editor MOTOR AGE—How could I convert a four passenger, 1917 Stutz, into a raceabout?

2—What actual horsepower does this car develop, and how high might this motor be geared?

3—What is the present gear ratio of this model?—A. D. Lewis.

1—A suggestion for converting a 1917 Stutz car into a clever speedster was published in the Readers' Clearing House of MOTOR AGE, issue of July 12.

2—It is hard to give the actual horsepower of this engine as this can be determined only by actual test on the block and usually the maker does not care to divulge this information. As far as the gear ratio is concerned, this also is a matter of experiment and depends upon whether or not the car is to be used for track work or road work. If you want it merely as a semi-speedster, better leave the gear ratio as it is.

3—The present ratio is 3½ to 1.

Lightweight Pistons for Tractor

Beebe, Wash.—Editor MOTOR AGE—My tractor has a 30 hp. four-cylinder engine with 4¼ in. bore and 5¾ in. stroke and is rated to run 940 r.p.m., which seems very high speed to me. Would there be any advantage in using lightweight pistons and connecting rods?

2—If so, what kind would you advise?

3—Would it relieve much strain on the crankshaft?

4—What is the advantage of a valve arrangement such as found in Reo cars when the valves are located in both the side and head of the engine?—Chester M. Armour.

1-2-3—No.

4—With an arrangement like this, where the intake valve is placed in the head of the cylinder and the exhaust on the side, a compromise is made between the L-head and valve-in-the-head type of engine. Such an arrangement makes it possible to easily remove the inlet valves, inasmuch as the latter are held in cages which can be unscrewed quickly for inspecting the valves. The exhaust valves in this case can be taken out of the engine without having to

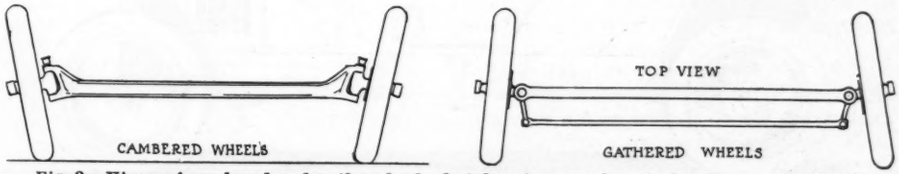


Fig. 2—Views of cambered and gathered wheels taken from angles of advantages. Cambered wheels may be gathered also

remove the cylinder head, as the cylinder heads are fitted with removable plugs directly over the exhaust valves so that the latter can simply be pushed through the opening left by the removal of the plugs.

Synchronizing Airplane Guns

Hillsboro, Ill.—Editor MOTOR AGE—Are the propellers on airplanes timed with the machine gun in those types of battleplanes using the rigid or fixed mounting for the gun, located just behind the propeller? Some contend the two are timed so that no damage will be done to the propeller as the shot passes through its arc.

2—Is the Roberts two-cycle aviation motor still being manufactured?—H. Clay Latham.

1—Yes.

2—Yes, by the Roberts Mfg. Co., Sandusky, Ohio.

Horsepower, Etc., of Stutz

Helena Station, Ky.—Editor MOTOR AGE—What horsepower has the Stutz four-passenger?

2—What size battery voltage does it use?

3—What is its weight?

4—Does it take hills well on high gear?—E. G. Davis.

1—Thirty-five.

2—The battery is a 6-volt, 120 amp.

3—About 3500 lbs.

4—Yes.

Larger Valves in Ford

Surprise, Neb.—Editor MOTOR AGE—Can I put larger valves in a Ford? If so, how large can I have them? Is there room for large valves?—Rolly Blais.

You can put in larger valves in a Ford car, but of course you must bore out the ports a little larger and make a new seat for the larger diameter of valve. Usually the Ford motor block can be bored out enough so that valves 1⅝ in. can be accommodated.

Adjusting Marvel Carbureter

Wallingford, Ky.—Editor MOTOR AGE—Who manufactures the Marvel carbureter and how do you adjust it?—William Roberts.

This instrument is made by the Marvel Carbureter Co., Flint, Mich. Instructions for setting the carbureter were published in the Reader's Clearing House of MOTOR AGE, issue of July 26.

Converting Buick Light Six

San Antonio, Tex.—Editor MOTOR AGE—Publish sketch of body exactly like that of the Marmon 34, two passenger roadster shown in your June 7 number, suitable for a Buick 1917 light six, using the same Buick radiator and hood.—T. T. Beynon.

A suggestion for converting the Buick Light Six into a speedster equipped with the type of body you desire is shown in Fig. 7.

Increasing Wheelbase of Ford

Milwaukee, Wis.—Editor MOTOR AGE—Is it practical to increase the wheelbase of a Ford chassis?

2—Where and how is it best to splice the frame members?

3—Would such an increase—about 12 to 14 in.—necessitate a change in the diameter of the driveshaft?

4—Suggest lines for a streamline roadster body with top and windshield based on the lengthened chassis.

5—Where and how can I obtain a scale drawing of a Ford chassis, giving dimension of frame?—N. L. Bierbach.

1—There is no reason why this could not be done without decreasing the efficiency of the car or weakening the constructional details.

2—One way in which this could be done is to cut the frame in two in the rear at about 8 or 9 in. before the tapered portion of the frame begins. A piece of channel section steel is then inserted and riveted to the car frame in the manner shown in Fig. 4.

3—No.

4—This is shown in Fig. 3.

5—It is hard to advise you on this point. about the only thing that we can suggest is that you go to some Ford dealer and measure the frame, etc., before the bodies are put on the chassis. We know, however, that the Ford frame is 22 in. wide.

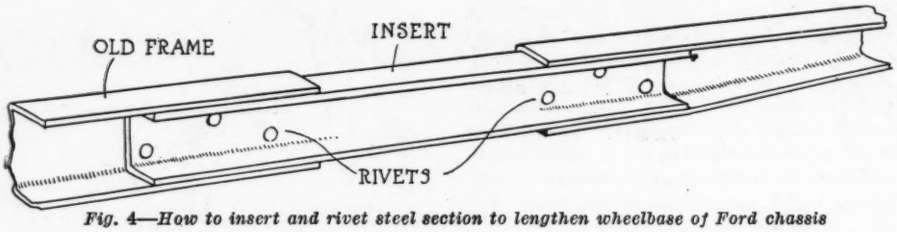


Fig. 4—How to insert and rivet steel section to lengthen wheelbase of Ford chassis

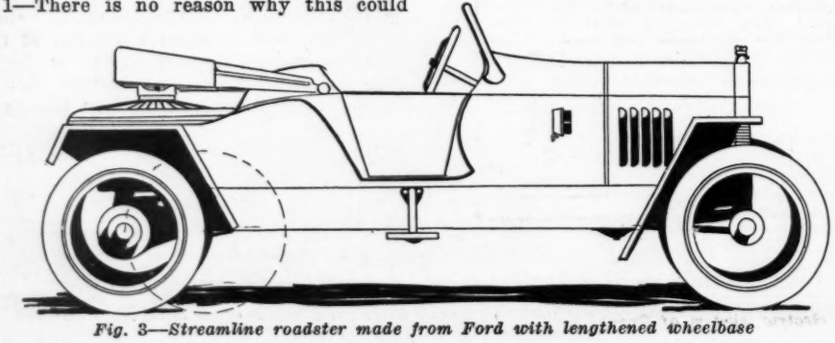


Fig. 3—Streamline roadster made from Ford with lengthened wheelbase

GRANT SIX REGULATOR EXPLAINED

Regulator Cut-Out Is Fitted with Two Armatures

Divernon, Ill.—Editor MOTOR AGE—Show a diagram of the Allis-Chalmers starting system used on the Grant Six and an explanation of the operation, especially of the regulator coil.—George H. Weber.

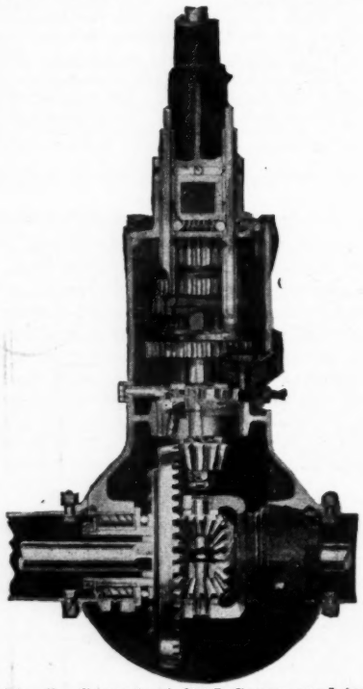


Fig. 5—Gearset of 1915 Saxon roadster

The wiring diagram of this car is shown in Fig. 6. The starting motor takes the place of the hand crank in starting the engine. The generator provides current for charging the battery and lighting the car. The battery serves as a reservoir, in that it stores electrical energy and delivers it, when required, to light the lamps and start the engine. The regulator cut-out controls the connection between the generator and battery and serves to regulate the charging current.

In the Allis-Chalmers single unit system, the functions of the motor and generator are combined into one unit called the motor-generator. Pushing the starting switch connects the battery with the motor-generator, which then operates as a motor to crank the engine. The motor-generator speeds up with the engine and, when it reaches a certain predetermined speed, is automatically connected to the battery and lighting systems by means of the regulator cut-out. If the lights are burning, part of the current is used in lighting, the surplus going to charge the battery. When the engine slows down below the charging speed, the regulator opens the circuit between the battery and generator.

Regulator Cut-Out

The regulator cut-out consists of a compound-wound electro magnet with two armatures, one of which serves as the cut-out and the other regulates the charging current. The shunt winding regulator is always connected across the generator terminals. When the generator voltage is sufficient for charging, the electro-magnet attracts the armature, closing the circuit.

The current flowing in the series coil then assists the shunt coil to hold the contacts together. With an increase in generator speed, the charging current will increase, strengthening the regulator electromagnet. At a certain critical point the second armature will vibrate, alternately cutting a resistance in and out of the generator field circuit, which will reduce the charging current by lowering the generated voltage. When the generator speed, and consequently the voltage, drops below the charging point, the reverse battery current flowing in the series winding neutralizes the shunt winding, releasing the armature and thus opening the circuit before the battery can discharge.

Clutch of His Saxon Four Slips

Jersey City, N. J.—Editor MOTOR AGE—When my 1915 Saxon roadster nears the top of a fairly steep hill, the engine runs away from the car. I have been told that the clutch slips. How can I remedy the trouble?

2—Show diagram of the gearset.

3—In the front of the gearcase is a small plate about the size of a half dollar. What is its purpose?

4—When I put transmission oil in the transmission and open the plug in the differential

case, the oil will run out of there. Must I oil both?—William Spahn.

1—To adjust the clutch release the jamb nut and turn the adjusting nut to the right until the spring is shortened about ⅛ in. Adjust all three springs alike and lock the jamb nuts securely. Also be sure to adjust all of them at the same time. If you find that this does not remedy the trouble, the clutch should be taken out and thoroughly cleaned with gasoline.

2—This is shown in Fig. 5.

3—Perhaps you refer to the oil filler cap or plug.

4—The differential housing requires 2 qt. of non-fluid oil about every 2000 miles and the transmission case the same amount, using in this case a transmission oil.

Advantages of Fixed Spark

Victor, Col.—Editor MOTOR AGE—What is the advantage of having a set spark on a four cylinder Continental motor?

2—Where can I buy an oiling system for Ford motor as shown in the June 7 issue, page 38, Fig. 1.

3—What is the diameter of the valve in the Roof sixteen-valve head illustrated in the June 28 issue?

4—What would be the best gear ratio for a Ford in a mountainous country with a Roof sixteen valve head.—E. O. Day.

1—In such a system the driver is not required to manipulate the spark lever and hence he is relieved from work. The advancement of the spark automatically in proportion to the engine speed makes corrections for mistakes on the part of the driver. Those who disfavor this system claim that when the engine is carbonized, the spark must be retarded considerably, otherwise the engine will knock.

2—There is no pump on the market like this that we know of. The one shown was suggested by MOTOR AGE.

3—About 1⅜ in.

4—This is hard to say, but it seems likely that the present Ford ratio would be satisfactory.

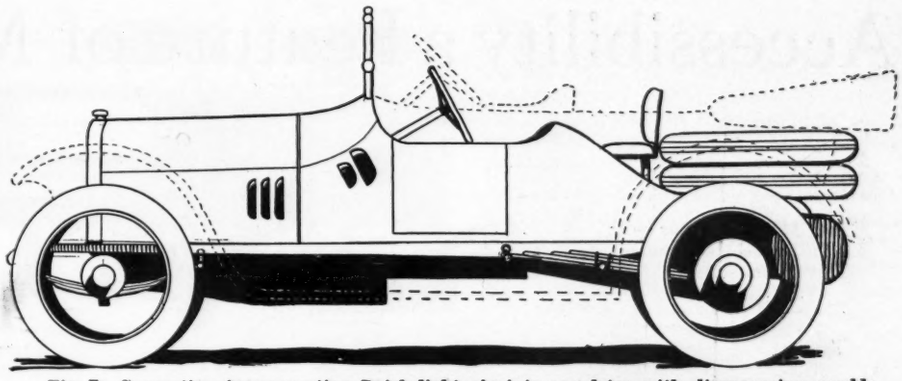


Fig. 7—Suggestion for converting Buick light six into speedster with disappearing rumble

PROBABLY DIRT IN CARBURETER

Reader Also Wants Method of Using Body Cleaner

Santa Ana, Cal.—Editor MOTOR AGE—The Buick D-Six-45 that I bought in January does not seem to idle properly. With the spark and throttle fully retarded the motor hits evenly, but when I advance the spark the motor will spurt up, then almost die and spurt up, then almost die and will continue this over and over again. It seems as if it does those two things every two revolutions. I have often seen other cars do the same way, but I should think that it is a rather new car to be acting in that way when it was purchased but six months ago. It has been run 4500 miles and I have ground the valves once.

2—I put wax on the car sometime ago and kept putting it on until it hardened, making the finish look very dull. I carefully scraped off some of the wax on a front fender and can see the bright finish underneath.

A reader recently inquired in your columns what to do in a case like that, and you told him to get some of the advertised wax removers. After reading that I purchased some Johnson's Cleaner, as I had used Johnson's Prepared Wax on my car in the first place. I got the cleaner because it and paint remover were about the only things pertaining to removing wax, oil or scum, and I was afraid the paint remover might hurt the finish.

The directions on the can did not make it very clear to me and I heard that it should be rubbed on hard and wiped off dry like. I tried this but without success, as it hardened. The way I finally came to use it was to keep it wet, rub hard and then sponge it off clean. Could you tell me the correct method of applying the cleaner?—Douglas W. Keech.

1—The trouble you are having is probably due to dirt or some foreign substance which is clogging the gasoline line or carbureter, unless you have changed the carbureter adjustment. If the engine was hitting regularly at high speeds before the trouble manifested itself and the carbureter adjustment was not changed, it is safe to say that there is a partial stoppage of fuel. The dirt may be lodging at the point of the needle valve and it takes but a tiny particle to obstruct the passage. If the carbureter adjustment has not been changed, mark the position of the needle valve and then unscrew it and clean it as well as the needle valve seat.

Directions for Use

2—The proper way to use Johnson's Cleaner, according to the manufacturer of this substance, is with plenty of water. Following is the mode of procedure: Take three pieces of cheese cloth, each one a yard square and wet one of them thoroughly in clean water. Then wring it out so that it will not drip. Put about a teaspoonful of the cleaner on the cloth and work it well into the meshes of the latter. Now take a space on the car amounting to about the size of half of the hood top and after wiping off the rust, apply the previously prepared piece of cheesecloth.

Now take a second piece of the cloth and wet it the same as the first and wipe off the cleaner just applied. This will take off the dirt as well. Wring out this cloth in a pail of clean water and wipe off the space on the car with it again. Keep up this process until no more dirt comes off. Finally take the last piece of cheesecloth and apply it to the surface dry. Wipe the surface until it is dry and it will be found to be perfectly clean.

Then take another part of the car and do the same to it. By cleaning the car in sections in this way, it is far easier than washing with a sponge and chamois. Keep the water clean and change it whenever necessary.

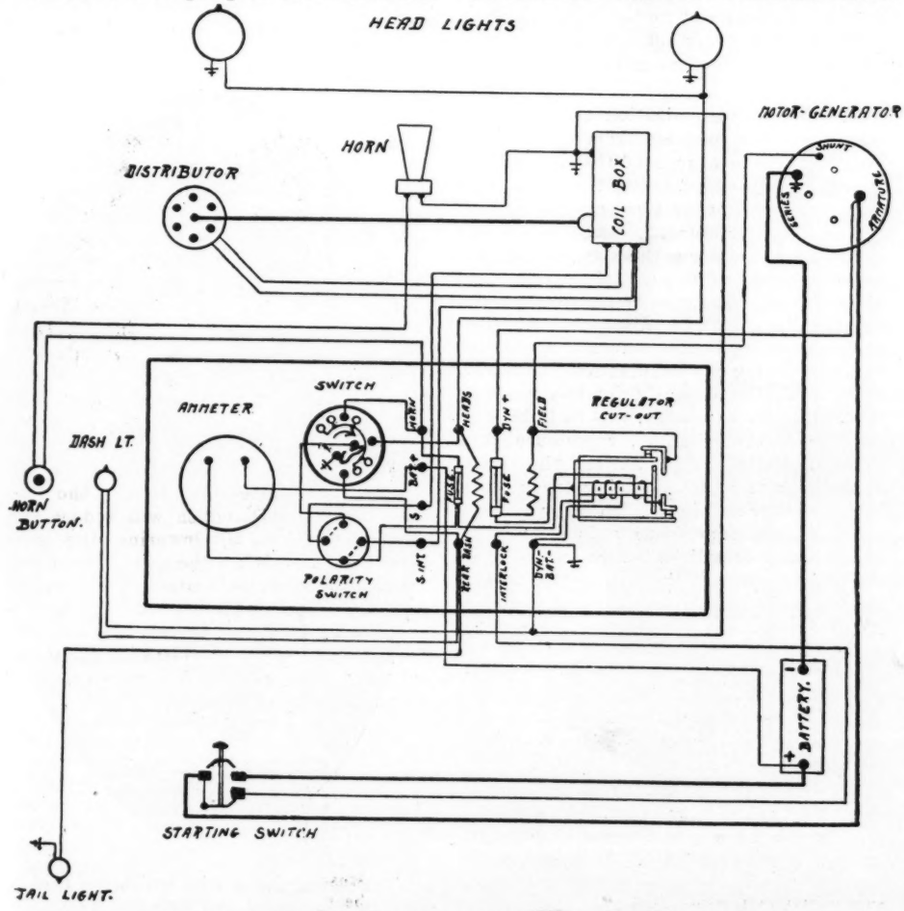
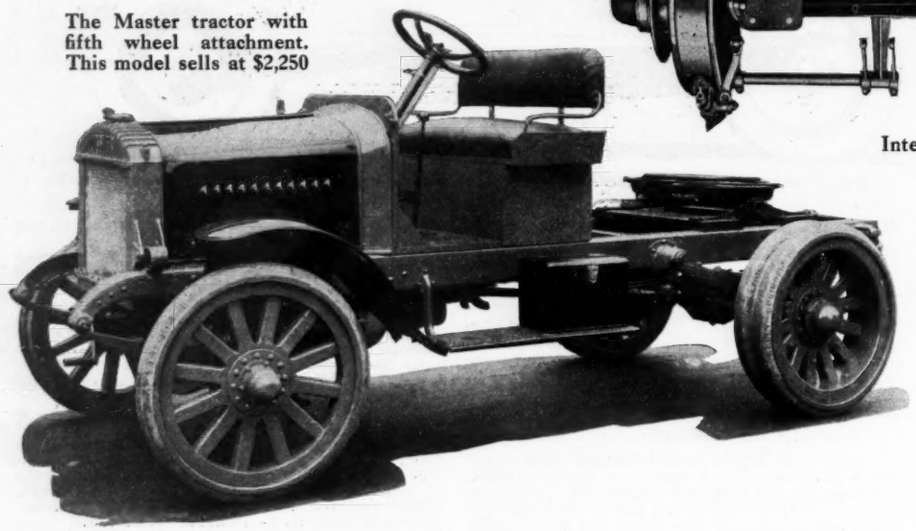
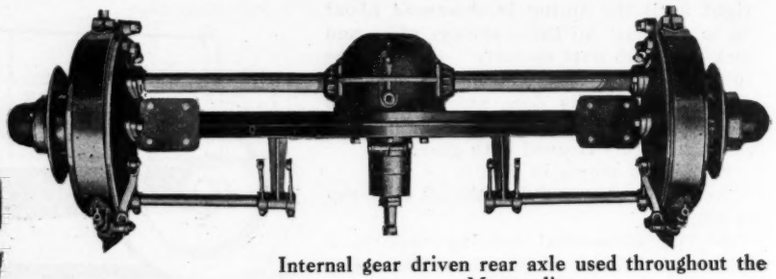


Fig. 6—Simplified wiring diagram of electric system of Grant six

Accessibility a Feature of Master Trucks



The Master tractor with fifth wheel attachment. This model sells at $2,250



Internal gear driven rear axle used throughout the Master line

The Line Includes Three Models and a Tractor—Designed to Meet Q. M. C. Rules

CHICAGO'S commercial vehicle industry has been augmented this year by the formation of Master Trucks, Inc., a new organization, but backed by men who are pioneers in the motor truck industry. Although the company was formed but a few months ago, it already is turning out trucks at the rate of five a day and has plans under way for a new plant, already having outgrown its present quarters, these plans being for three buildings 75 by 400 ft. each and a separate office building on the Chicago Belt Line on the south side of the city. The Master Truck organization plans find a parallel in those of certain motor car companies who are adapting themselves for the extensive production of airplane engines and parts. The Master company is building trucks that comply with the standardized specifications of the Quartermaster's Department and the expansion plans have been made with the thought in mind of being able to turn out trucks in quantities that will be in harmony with the requirements of the Quartermaster's Department. Furthermore, Master trucks have been designed so that they are most accessible, dismantling and replacing of the major parts being a matter of minutes where in some construction the same work means hours.

Ample Capital

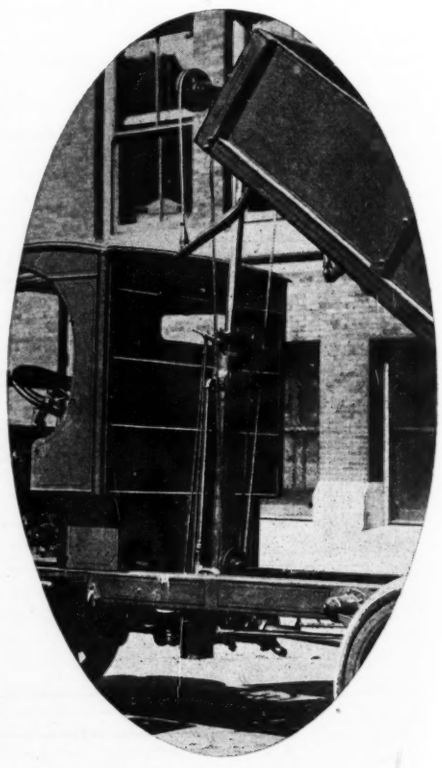
That there is ample capital at the command of the organization to bring to fruition any plans for expansion is evident from the personnel of officials. M. S. Rosenfield, owner of the Sunnybrook Distilleries, one of the largest if not the largest in the country, is president, R. M. Reid, well known in financial circles, is secretary and treasurer; Eugene Goldman, who made the first Randolph truck fourteen years ago and who also designed and built the Mogul, is general manager. Frank Dawson, who has been associated with Mr. Goldman since the latter's beginning in the truck field, is engineer and factory manager. The directors and other officials are all men who have made successes in their particular lines.

The Master organization is making a strong bid for business from Uncle Sam. This work is in charge of George J. Kavanaugh, who perhaps, better than any other man, knows war conditions generally, having been a close student of war before the motor truck became such an important factor in military affairs and since that time as well. Mr. Kavanaugh represented the Chicago Record on the dispatch boat, Hercules, operating in the waters of Cuba and Jamaica during the Spanish-American war, acted in similar capacity for two years in the Philippine campaign, was in Cuba during the Boxer rebellion, represented the Chicago Daily News during the Russ-Japanese war and was doing truck work on the border and in Mexico last year.

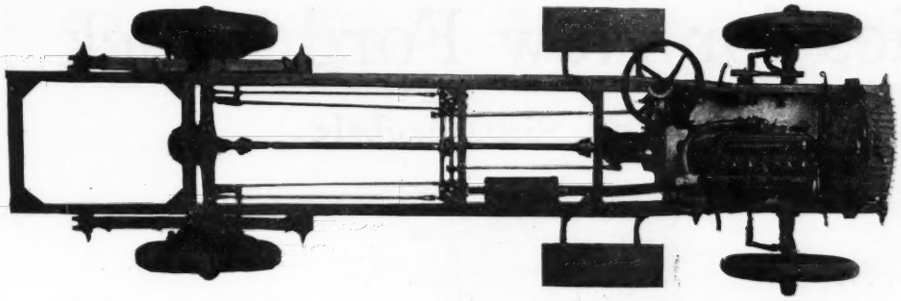
When the new factory is completed, which probably will be before Jan. 1, next, the Master line will include a 1½, 2-, and 3½-ton model and a tractor with a capacity of 6 tons. At present the 2-ton model is the only one being made. This sells for $1,990. The 3½-ton job will sell for $2,990 and the prices of the remainder of the line have not been fully decided upon as yet, except for the tractor which will list at $2,250.

All of the trucks will be Buda engined, with the heavy-duty type. The engine used in the 2-ton model has a bore of 4¼ in. and a stroke of 5½. It is suspended from the chassis at three points. Oiling is accomplished by pressure feed, the oil being carried to the crankshaft bearings under pressure through holes drilled in the shaft. The oil pump has an 80 per cent greater capacity than is necessary for normal efficient lubrication. The engine is equipped with a governor which regulates the speed of the engine and truck. Cooling is by centrifugal pump in connection with a honey comb radiator of heavy service type with cast housing and flexibly suspended by special spring radiator hangers. The radiator is Master's own make. Removal of the radiator is very simple, only two bolts—those which shackle it to the spring mountings—and the hose connection, being removed to dismantle the radiator from the chassis.

Ignition is by Eisemann high-tension, water-proof magneto with set spark and the carbureter is a special Master-Buda design, made to give a uniform fuel mixture under all weather conditions. The gearset is the conventional three-speed with gears of nickel steel and shafts of chrome nickel steel. The clutch is a mul-



The Master hoist with which the load may be dumped and body put back in place in less than 1 min.



Chassis view of the Master truck. Note that the drive is through a two-piece shaft. This is fitted with three universals and one self-aligning ball bearing, giving practically straight-line drive under load

tiple disk and with the gearcase forms a unit powerplant with the engine. The disks are hardened steel, faced with Raybestos.

Practically straight-line drive is offered from the transmission case to the Trobensen, internal-gear drive rear axle through a 2½-in. two-piece tubular shaft with three Arvac universals and one self-aligning ball bearing. The load is carried on an I-beam dead axle and the rear wheels are equipped with roller bearings. The dead axle is guaranteed for the life of the truck and a guaranty bond is furnished every user.

Both front and rear springs in the Master 2-ton model are semi-elliptic, the front measuring 44½ in. by 2½ in. with eleven leaves. The rear springs are 52 in. long, 3 in. wide and have thirteen leaves. A special feature of the spring construction is the absence of a bolt through the leaves at the point where they rest on the axle. A shoulder is cast on one side of the leaves and a depression on the other into which the shoulder on each successive leaf fits. Two strap bolts hold these into the plate in which the spring is seated and thus holds the spring in place. The absence of the bolt in the middle of each leaf tends materially to increase the strength of the spring.

Steering Gear

The steering gear is semi-irreversible, worm-and-nut, with an 18-in. wheel. The frame is pressed steel with all spring hangers and cross-members hot riveted, the spring hangers being steel castings. The spring hangers and shackles are extra heavy to compensate for torque stresses without the use of radius rods. There are four cross-members in the frame, reinforced by gusset plates. The frame length is 207¾ in. The steering column and gearing is so designed that it may be dismantled in 7 min. which is but one of the several features built into Master trucks that repairs can be made quickly and easily on the field in war time. The front axle is Timken, I-beam.

The conventional internal expanding and external contracting brakes are fitted and the wheels are made with square spokes. Tires are of the pressed-on type, 34 by 4 front and 36 by 6 rear, Kelly-Springfield. Thirty-six by 4 dual rear may be had for $85 extra. The wheelbase is 144 in., with a loading space back of the driver's seat of 120 in. Equipment consists of three oil lamps, tools and a siren whistle fitted to the front cylinder of the engine.

Several types of bodies are offered, one an open, express body 11 ft. long and 5 ft. wide, which, exclusive of cab sells for $100. There is a commission body at $225 and also a stake body at the same price, with three sizes of cabs that sell at $65, $85 and $100 respectively. There also is a dump body with a special hoist that is manufactured by the company, this hoist being especially rapid, dumping a load and putting the body back in position in less than 1 min.

The tractor differs little in detail from the 2-ton truck except that the chassis is shorter and a fifth wheel with universal action is attached for using a two-wheeled tractor and drawbar fitted for four-wheel trailers.

TWO-TON DOBLE TRUCK

San Francisco, Cal., Aug. 10—The Doble Laboratories are completing a 2-ton truck model, regular manufacture of which will be carried on here. This truck is to be followed by a 1000-lb. general utility chassis and a 3½-tonner. The trucks will run on kerosene or gasoline. The company owns the basic patent on the automatic system using kerosene and cheaper oils as a fuel. It is the plan to license regular motor car and truck makers, etc., to use the Doble system in their products and to act as advisory engineers in designing the powerplant.

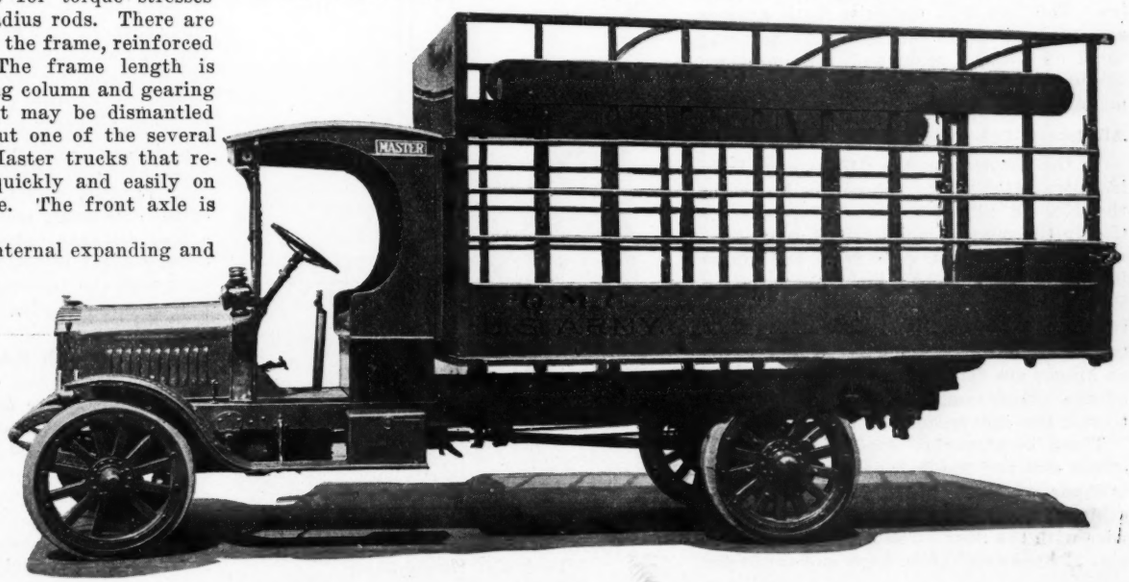
The Doble Laboratories were established in 1913 and incorporated under the laws of California February, 1917, to develop the patents and inventions owned by the company and to maintain a research laboratory, making a specialty of the problems of combustion systems and powerplants, especially for motor cars, trucks, tractors, motor boats, stationary plants and isolated farm plants.

WOLVERINE CAR SOON

Kalamazoo, Mich., Aug. 9—The Wolverine Motors, Inc., has started work on the construction of the Wolverine Speedway Special, a sport roadster. The company's plant is not yet completed, and the first model is being made at a local garage. It will be ready for road tests within the next three weeks. The frame is of 7-in. suspension type. Front and rear axles are made by the American Ball Bearing Co. of Cleveland; engine, by Wisconsin Motors; transmission, by the Warner company, and springs by the Kalamazoo Spring & Axle Co. The car will be equipped with Hartford shock absorbers and will carry 33 by 5 cord tires.

PIERCE EARNS $6.66 A SHARE

New York, Aug. 10—The Pierce-Arrow Motor Car Co. for the six months ending June 30 had earnings equivalent to $6.66 a share on 250,000 shares of common stock, after allowing for dividend requirements on the preferred stock. Net operating profits for the six months were $2,317,562, which, after allowance for interest and depreciation left a surplus of $2,066,932. Net operating profits for the three months ending June 30 were $1,303,376, which, after allowing for interest and depreciation, left a surplus of $1,176,257. These figures make provision for all the company's taxes except the excess profits tax and other taxes now under consideration by Congress.



This is one of the trucks fitted with a special body turned out by the Master Trucks, Inc., for the Quartermaster's Corps

Parry Bodies for New Ford Truck

To Develop Five or Six Models

Parry express body fitted with all-season cab on Ford truck chassis

RIGHT on the heels of the announcement of the Ford worm-driven truck, the constructional details of which were given in the July 26 issue of MOTOR AGE, comes the manifesto of a suitable line of bodies applicable to this particular truck and made by the Parry Mfg. Co., Indianapolis, Ind. This concern has been manufacturing truck bodies for various cars for some time, especially bodies suitable to the regular Ford pleasure car chassis and it is therefore only natural that its field of constructional endeavors was widened to take in the new Ford truck chassis.

Only one style of body, called the 610 express body is shown herewith, but the concern is said to be working out a line of bodies for this truck to take in the varied requirements of the commercial car field. In all, five or six bodies will be developed, all of them using more or less the same standard of construction. The Parry company states that as soon as the Ford company can make deliveries on the new truck, it will be in a position to furnish the bodies. The line will comprise both express and stake bodies, and by manufacturing them on a large scale and running them through in uniform design, assurance is made of rapid deliveries.

All-Season Cab

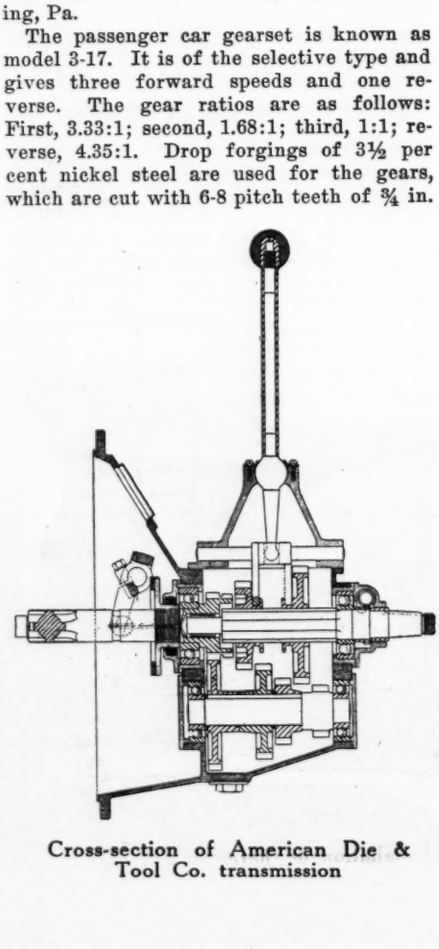
In the illustration the 610 express body is shown fitted with what will be known as the No. 52 all-season cab. For ventilation in the summer months, it is only necessary to remove the pins from the hinges in the right door and remove the latter. Removal of four bolts on the left side of the cab allows the panel over the fore door to be taken out. Windows which swing on hinges are fitted to the cab on each side of the driver and these can be adjusted to suit the convenience of the operator.

There is plenty of loading space back of the seat and the floor of the body, which is made of seasoned hardwood, is further protected by steel strips which run lengthwise with the floor. The outside panels are also of hardwood 14 in. high and supported by heavy wrought braces on the inside and malleable iron braces on the outside. The flare boards are amply supported with wrought iron braces and the outside edges protected from wear by double steel strips. At the rear is an end gate heavily ironed and equipped with an adjustable chain.

American Transmission

TRANSMISSION gearsets for trucks and passenger cars are manufactured by the American Die & Tool Co. of Reading, Pa.

The passenger car gearset is known as model 3-17. It is of the selective type and gives three forward speeds and one reverse. The gear ratios are as follows: First, 3.33:1; second, 1.68:1; third, 1:1; reverse, 4.35:1. Drop forgings of 3½ per cent nickel steel are used for the gears, which are cut with 6-8 pitch teeth of ¾ in.



Cross-section of American Die & Tool Co. transmission

face. The case is made of aluminum, with an integral bell housing of either type A, B or C, S. A. E. standard. The forward shaft end is machined to fit a Borg & Beck model D-A clutch, whereas the rear shaft end is machined to the S. A. E. standard taper or square dimensions. The design is arranged for a speedometer drive through helical gears from the main shaft back of the rear bearing and for driving a tire pump from the reverse idler. The control lever can be made of any length to suit the customer.

The latest model of the company for motor trucks is designated as Model 5A and affords four forward speeds and one reverse. It is furnished either with an aluminum or a cast iron housing, at the option of the customer. All bearings are of the conical roller type, including the pilot bearing inside the constant mesh pinion. The primary shaft is of tenspline construction, while the secondary shaft has the low speed and reverse pinions forged integral with it and the other pinions secured by means of Woodruff keys and fixed in position lengthwise by a collar and circular spacers. All gears are made from 3½ per cent nickel steel drop forgings and are cut with stub teeth of 6-8 pitch. With the exception of the constantly meshed set of gears, all gears have a face width of 1¼ in. The gear ratios are as follows: First, 4.01:1; second, 2.61:1; third, 1.50:1; fourth, 1:1; reverse, 4.85:1. The width of face of the constantly meshed gear is 1 in. The center distance between primary and secondary shaft is 4½ in., which would indicate that the transmission is designed for use on 5-ton trucks.

GOODYEAR SALES $11,601,200

Akron, Ohio, Aug. 10—The net sales for the Goodyear Tire & Rubber Co. for June were $11,601,200 as compared with $6,279,000 for June of last year. The net profits for the first six months of the current fiscal year ended April 30 were $5,379,112, against $7,003,330. The six months' earnings were at the annual rate of 46 per cent on the common stock.

Menominee Brings Out 5-Tonner

New Model Is Offered at $4,150

New model 5-ton Menominee truck in operation

THE new model J 5-ton Menominee truck constitutes a further development of the 3½-ton truck brought out by the company, the Menominee Motor Truck Co., Menominee, Mich., during the summer of last year. Practically all of the features of the earlier model are embodied in the newcomer so far as the design is concerned.

The engine is a 4½ by 5½ in. Continental, mounted in a sub-frame suspended at three points. The radiator is of Menominee design, and rests upon pneumatic supports, an original idea of this company. The clutch is a Borg & Beck, three-plate type, while the transmission, which is hung amidships, is of the Cotta selective type individual clutch system, having all speed changing gears constantly in mesh and built for heavy duty work. The speed ratios are as follows: First speed, 4 to 1; second speed, 2 to 1; third speed, 1 to 1, and reverse, 4⅛ to 1.

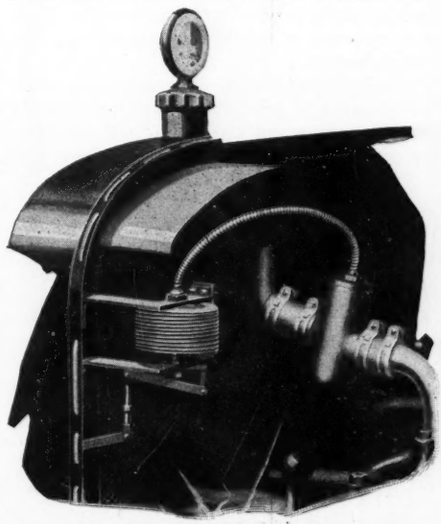
A Gemmer irreversible heavy worm and gear steering gear is used with a 20 in. hand wheel. Right or left hand drive is optional. The front axle is a Timken drop forged I-beam axle, equipped with Timken taper roller bearings. The final drive is made through a Timken David Brown worm gear and floating nickel steel axle shaft. The worm gear reduction is 13⅜ to 1. A 7-in. heat-treated channel steel frame is used, thirty-eight inches wide. The springs are of alloy steel, 44 by 3 in. semi-elliptic front and 54 by 4 in. semi-elliptic rear. Both the service and emergency brakes are of the internal expanding type, 4 in. in width and operating on 24-in. drums. Both brake systems are equipped with equalizers.

Structural I-beam steel with special steel casting ends is used in the radius rods. The construction is similar to that of a very large universal joint at the forward end, where the rod is attached to the frame bracket. These rods are practically straight when the truck is loaded, thus relieving the springs of all driving strains and maintaining uniform distance between the axle and transmission.

The wheels are of artillery pattern 36 in. in diameter, and carry a 36 by 6 in. solid rubber tire in the front and 36 by 6 in. duals in the rear. The chassis equipment includes driver's seat, running boards, gas headlights, horn, front fenders and full kit of tools. The weight of the chassis complete is 8200 lb. and it is priced at $4,150.

Columbia Radiator Shutter

AUTOMATICALLY controlled radiator shutters constitute one of the refinements of the new Columbia Six sport model, giving a constant engine temperature. Neither the shutter nor thermostat idea is new in the car field, but the application of the two as a unit is decidedly new. This particular control of the water temperature on the Columbia is made possible by a syphon thermostat placed in the water return line.



Installation of thermostatic radiator shutter control on Columbia

In addition to the increased convenience obtained by this method of shutter control, it is stated that a marked increase in engine efficiency and economy is effected. High engine temperatures are essential to good performance with to-day's low-grade fuels, and this is possible it seems with this installation, without the possibility of overheating the engine.

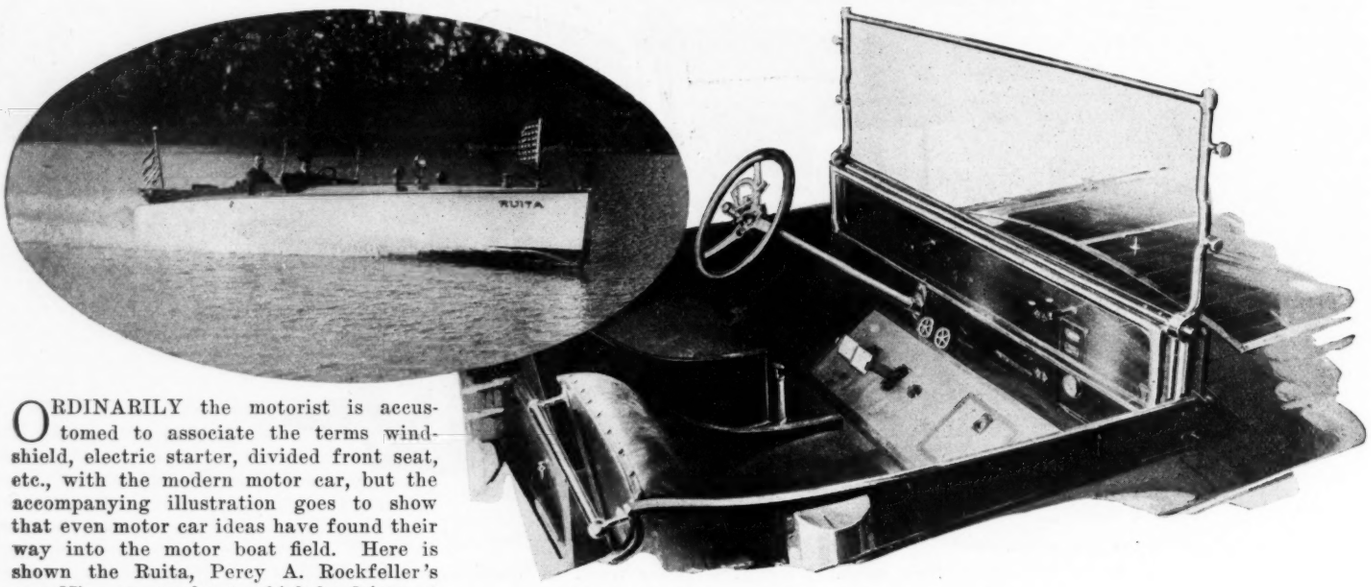
In adapting the thermostat to shutter control, a division into two parts was necessary. The first comprises the usual expansion drum, which is forced open by the action of the gas formed by heat from the contained liquid, operating the shutter through a system of levers. The second part is a thin copper tube, held in an iron housing placed in the water return line and containing the sensitive liquid.

At temperatures under 140 deg. Fahr. the thermostat is inactive and the shutters are held close, permitting little air to pass through the radiator. As the engine warms up and approaches a temperature of 140 deg., the liquid in the return line container starts to change into a gas, creating a pressure upon the expanding drum, causing it to operate, and to open the radiator shutter. This opening action is continued until an engine temperature of 180 deg. is reached, at which temperature the shutter is entirely open. Any variation in engine temperature affects the thermostat, and the shutter is automatically shifted to meet the new conditions.

A Boyce motometer is an essential part of the equipment, and shows the driver at all times that the temperature of the engine is being properly regulated and that no dangerous temperatures are being reached. The thermostat is manufactured by the Fulton Co., Knoxville, Tenn., and the shutter by the Detroit Motor Appliance Co., Detroit.

A Motor Boat with Motor Car Traits

Percy A. Rockefeller's Ruita



The interior of the Ruita is very similar to the interior of a motor car

ORDINARILY the motorist is accustomed to associate the terms windshield, electric starter, divided front seat, etc., with the modern motor car, but the accompanying illustration goes to show that even motor car ideas have found their way into the motor boat field. Here is shown the Ruita, Percy A. Rockefeller's new Niagara runabout, which he drives at Saranac Lake. One of the unusual features of this craft is the windshield, which folds down in two sections in front of the bulkhead. The operator can get to the forward deck without the trouble of crawling over or around the windshield with the accompanying danger when in a heavy sea. The boat is controlled from the operator's seat entirely and slanting foot-boards bring all pedal controls into easy reach. The boat is equipped with an electric starter, electric lights, searchlight and foot pedal reverse control. A modern one-man top is also included in the equipment, which gives the boat a still further aspect of the motor car. The operator's seat, just back of the engine pit, is divided, upholstered in water-proof leather and shaped to fit the body. The seats have panelled backs, with locker and refrigerator underneath. At the stern is a full width seat upholstered in leather and in the cockpit are four wicker chairs. The boat is 32 ft. long and equipped with an 80-100 Van Blerck engine, capable of driving the boat at a rate of 27 m.p.h. with comfort and safety.

Perfection Circulator—Its Simplicity of Construction and Ease of Installation

THE Perfection circulator, manufactured by the Motor Cooling Systems Co., Baltimore, Md., is designed and proportioned to maintain the temperature of an engine at its most efficient point and to prevent additional heat, incident to heavy pulling, from raising the water to the boiling point. It is in reality an air operated single tube ejector, designed to use the expansive velocity of a small amount of the exhaust gases from the engine and import this velocity to the water normally in the lower connection between the radiator and the engine. The water at this point is forced by the impact of the jet and also by the displacement of the gas, moving in the direction imparted by the jet. Primarily the circulator was brought out to be used on Ford cars, but it is the intention of the concern to so construct the device that it will be applicable to all makes of cars.

Only a small amount of gas, less than 3 per cent, is required to operate the circulator, it is said, because the cooling system is balanced. That is, the engine and radiator are connected together at the top and bottom, so that any variation of water level affects both alike. Thus very little energy will set the fluid in motion when the balance of forces is equal.

The heat generated in the cylinders and the pressure and volume of the exhaust gases are proportional to the amount of gasoline burned and as the motive power of the circulator is derived from the exhaust gas, the flow of water through the cooling jackets will be proportional. This, it is claimed, is the ideal relation between these factors.

Simplicity of construction and ease of installation are predominating features of the Perfection circulator. It has no moving parts subject to wear, cannot leak and one of its best features is that it can be installed on an engine without any alteration to the latter. The only machine work necessary to install the system is the drilling and tapping of a hole in the exhaust manifold for installing the control valve of the device. Above this valve is a ball check valve which prevents the gases from going back into the manifold. The nozzle tube, which replaces the water pipe ordinarily fitted on the lower hose connections of the Ford engine contains the ejector and an outside connection of coupling to which the tube from the ball check valve is connected.

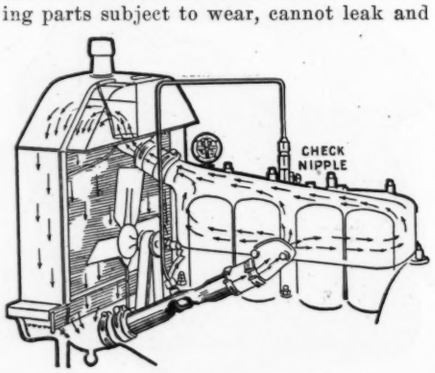


Diagram of Perfection circulator installed on a car

Actual conditions in an engine at different temperature in the water system are shown in the dynamometer test chart accompanying this article. This test was carried out by the company recently and the temperatures were taken in a by-pass from the outlet, so that the actual temperature of the water immediately surrounding the cylinders was approximately 25 deg. higher. A represents the compression cycle, B the efficiency of power and C represents efficiency percentages. The shaded part between X and B represents the power loss or the heat lost through radiating to water system. For example, at D the tempera-

ture of water was 90 while the space between lines X and B at this point shows that the motor was giving only about 17 per cent efficiency, or only two-thirds its power. When the temperature of water got up to 130 the efficiency was only 22 per cent. At F the power curve coincided with the compression curve which represents the highest thermal efficiency.

After passing efficiency point F the power falls off very rapidly due to power loss by low induction, overheated cylinders; the cylinder walls are so hot that the first portion of gas drawn in, striking these overheated walls, expands very rapidly and thus prevents a full weight power charge being drawn in. In other words, weight of fuel in the charge is very much lower than normal, and power available in the explosion is consequently much less. This loss terminated at H by pre-ignition.

In conjunction with this test was that of a Ford car equipped with the Perfection water circulator, and a thermometer, in a closed garage. The thermometer showed a temperature of the water in the water jackets of 190 deg. The spark was then fully retarded and the motor run 1200 r.p. m. for 30 min. At this point the exhaust manifold got red hot. In spite of the tremendous heat being generated, the temperature of the water, it is claimed, dropped from 190 to 160 deg. This was due to the increased flow of water which is produced by the very small per cent of exhaust gas which is forced into the water system just as soon as too much heat is generated. It was not, evidently, a question of the Ford radiator not being large enough to do the cooling part of it, but only a matter of forcing the heated water to the cooling surface fast enough for the desired effect.

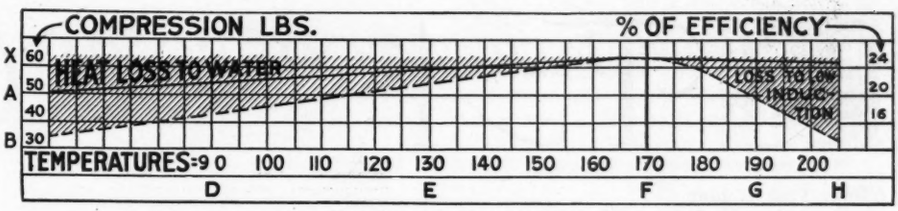


Chart showing results of dynamometer test made of the Perfection circulator

A thermostatic control is also provided for this system and is furnished at an extra cost. When used with the circulator, the thermostat is mounted in the top of the water jacket and is controlled by a definite temperature, below which no acceleration of the water flow can take place. But when the temperature reaches this point, it opens and permits the exhaust to operate the circulator. When the water cools, the reverse action takes place and closes the connection tube until the water in the engine gets up to the correct temperature again. The price of the Perfection water circulator for Ford cars is $7.50 and the price of the thermostat is the same.

Dividing the Motorist's Expense—How He Spends His Dollars

INVESTIGATION recently made by one of the large motor car manufacturers in which it asked for figures from several thousand of the users of its product, shows how the motorist spends his dollar. Many owners imagine that the major part of the outlay they turn over for their cars goes for items like oil, fuel and repairs which are purchased frequently in small quantities.

The largest expense to the motorist is the four tires, even when the car is giving a tire mileage of nearly 7500. Tires which are good for a figure in excess of 10,000 miles are an exception. This mileage claims $1 of every four which the motorist puts down on the counter of the equipment retailer. It is estimated that the cost of inner casings is approximately one-eighth of the total tire expense.

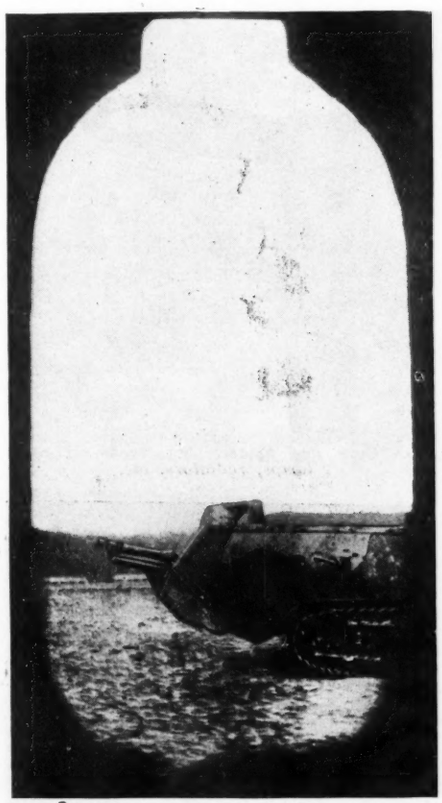
Next in importance is the gasoline expenditure. Fuel costs 22 cents a gallon on annual average the country over and it was found that the nation-wide average takes 37 cents out of every dollar to keep the engine running. In the investigation which produced the figures given here it was nearly 15 m.p.g. of fuel.

Weather has an important effect on the segments of the motorist's appropriation which the gasoline and tire outlays cover. In summer, the higher temperatures give conditions for almost perfect vaporization in well-cooled engines. The weight of demountable tops and the addition of tire chains in winter cut mileage one-fifth and fuel mileage one-third.

The motor car's repairs and replacements are third in importance. They amount to 8 per cent of the season's bills with expense varying greatly with the skill of the individual driver. The money spent for motor car lubricants ordinarily amounts to 4 per cent of the total outlay over the year.

TOURIST WELCOME IN CANADA

Detroit, Aug. 10—Americans as tourists still are welcome in Canada, in spite of rumors to the contrary that seem to have reached many motorists in this country.



An armored tank photographed from an armored tank—the creeping kinsman of the armored car

"American tourists are welcome this year in Canada as in previous years," says W. W. Scott, superintendent of immigration at Ottawa, Ont. "Bona fide tourists, being citizens of allied or neutral countries, may enter Canada without a passport and leave without a permit. They are assured courteous treatment at all times. Citizens or subjects of any enemy country may not enter Canada. Persons born in an enemy country but naturalized in the United States or in some other allied or neutral country should carry their naturalization papers. Persons of evident enemy origin, but who claim to have been born in the United States or in some allied or neutral country, should carry a birth certificate or some other evidence of their birthplace. Males of United States registration age are not encouraged to enter Canada without some document showing that they are permitted to leave the United States."

On arrival of a car in Canada the owner must show a license card or permit issued by his home secretary of state. If he desires to remain in Canada 24 hr. this card is taken and held until his return. He must leave at the point he enters Canada. If he remains in Canada longer than 24 hr. he gets a thirty-day bond or permit, which must be canceled by a Canadian customs officer when the car leaves Canada. He may leave from any port.

A motorist from a state with a reciprocal agreement with Ontario must take out an Ontario license if he stays for more than thirty days; until then his license is good. At present these states have reciprocal agreements: Kentucky, New York, Maine, Vermont, Connecticut, Maryland, Pennsylvania, Ohio, West Virginia, New Jersey, Michigan, Wisconsin, Minnesota, Illinois, Indiana, Iowa, Massachusetts, Missouri, Tennessee and the District of Columbia.

The Accessory Corner

Climax Flag Holder

THIS flag holder is attached to the lamp brackets, cross rod between lamps, radiator studs, or to the windshield and holds the flag staff in place by means of a spring lock. The holder is steel, finished in black enamel, with dull satin finish. They are 35 cents each, or 60 cents per pair. Climax Shock Absorber Co., Benton Harbor, Mich.

Simplex Windshield Bracket

The Simplex Mfg. Co., Anderson, Ind., has recently placed upon the market a new ventilating windshield bracket for Ford cars that can be mounted in a few minutes and enables the driver to tilt the lower section of the glass windshield and throw a current of air on the floor of the car in front of the driver's seat.

Hill Castellated Nuts

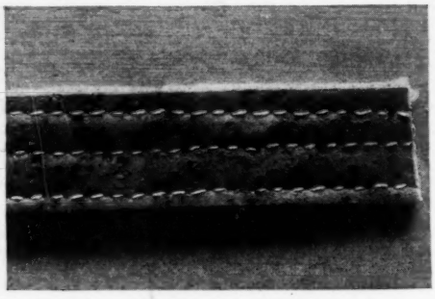
The Hill Pump Valve Co., Chicago, known to the motor car industry as the maker of the Utility tire pump, heaters and wrenches is now making a specialty of manufacturing castellated nuts for the use of motor cars. The company has been manufacturing these for some time on a small scale, but recently purchased twenty-six multiple spindle automatic screw machines, together with other shop equipment for carrying on the business on a much larger basis. While the company specializes in making castellated nuts, it states that any other business, in the line of screw machine work, will be done.

Hub Cap Demountable Wheel

By means of this attachment, Ford wheels may be removed by simply removing the hub cap—and a new wheel replaced by a reverse operation. Special hubs replace the Ford hubs and are attached permanently to the axle ends. Flanges are attached to the checks of the wheels and carry driving lugs, or bolts, that engage the flanges attached to the inner end of the special wheel hubs. The wheel and the hub are held together by a special hub cap. An extra wheel carries the spare tire, inflated and ready for use. The price, complete, is $15. Auto Accessory Mfg. & Sales Co., Benton Harbor, Mich.

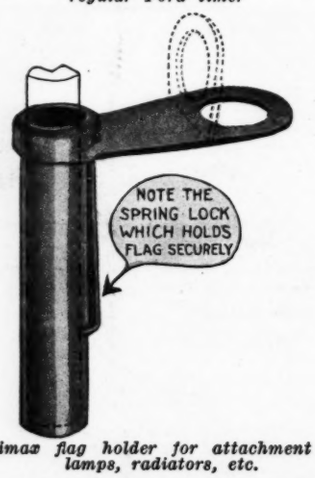
Shortless Timer for Fords

This timer, intended to replace the ordinary Ford timer, has no binding posts and carries the wires in a fiber insulating arm to a safe distance from the fan belt and oil splash, thus eliminating any chance of a short circuit from torn and disconnected wires. The insulating arm and wires are carried as a unit and the connections once made are never touched again. The only connections necessary to make are those on the terminals of the dash. The commutator ring is of conventional design, with the exception of the four brass dowel pins which hold it in place. This ring is the only part that requires replacement and can be slipped into proper position at a moment's notice. The four pins will register with the holes in the timer case and no attention need be paid to getting certain pins in certain holes, as all of the connections for the proper firing order of the engine are made in the timer case when the instrument is assembled. The price of the Shortless timer complete with all necessary wires is $5. The timer ring only sells for 75 cents. American Automobile Accessories, 2776 Francis Place, Chicago.



Sure-Hold transmission band linings for Ford cars

Shortless timer, intended to replace regular Ford timer



Climax flag holder for attachment to lamps, radiators, etc.

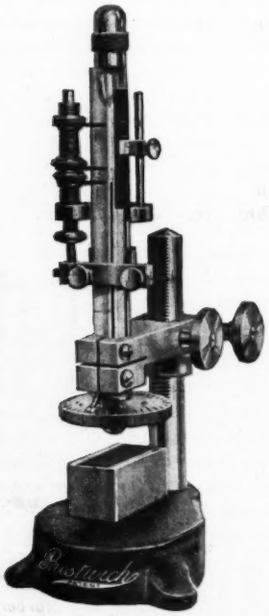
Continental steam vulcanizer, which comes in pocket size

Sure-Hold Lining for Ford Cars

These transmission band linings for Ford cars are made up with a composition cork facing and an ordinary cotton backing. The cork composition, which is oil-proofed, is said to not only outwear the fabric lining, but will also never harden and cause the transmission bands to chatter. Also, due to the higher cœfficient of friction, it is not necessary to apply the brakes as hard as with the fabric linings. The Sure-Hold lining comes in a set of three in a box with the necessary number of rivets to apply them to the bands. The price is $3 a set. Right Motor Specialties Co., 1322 Michigan avenue, Chicago.

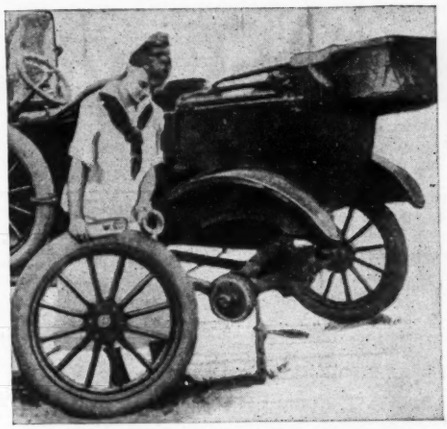
Prestwich Fluid Gage

In view of the fact that micrometers and gages are liable to wear and that much skill is required to use them accurately, the Coats Machine Tool Co., Inc., New York, has just brought out an instrument called the Prestwich Fluid gage designed to accurately check quantities of duplicate parts to close limits. It is claimed that the device is capable of handling accurately measurements up to 1/10,000 in. The gage has been found especially useful in the motor car industry in the measuring



Prestwick fluid gage

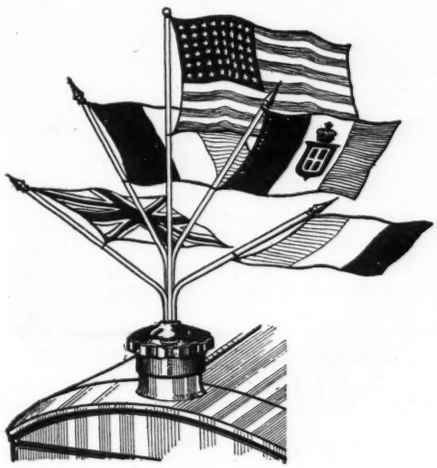
of piston pins, push rods, push rod guides, valve stems, for testing steel balls, both for accuracy and sphericity. The instrument consists of a fluid-containing chamber having a flexible diaphragm, a glass tube of fine bore which is connected to the fluid chamber and means for indicating the dimensions of the piece, and means for correcting for variation in temperature. A displacement of the diaphragm causes a displacement of the level of the fluid in the tube relative to their respective areas. Any variation in the size of pieces passed under the gage is indicated by the difference in the height the level rises in the glass tube.



Hub cap which facilitates removal of wheels on Ford cars

Liberty Flag Holder

Instead of carrying only one flag, this flag holder, which is made by the Stanley Mfg. Co., Dayton, Ohio, carries four other flags. So when placed on one's car, the holder is in the shape of a big fan with five strikingly colored flags from tip to tip. Realizing that so many motor car flags have been ruined by the winds, the Stanley company has made an effort to have flags which are silk and heavily stitched at the edges to prevent fraying. Steel flag staffs are set securely in the heavy nickel finished holder. There is no chance for them to warp in the heat or break in the wind.

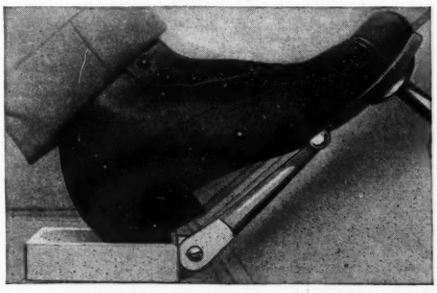


The Five Allies flag holder, made by the Art Metal Works

Continental Foot Rest and Vulcanizer

The Continental Auto Parts Co., Knightstown, Ind., has produced a new foot rest which is not only adaptable to any and all types of cars, but which readily adjusts itself to any position of the foot and enables the driver to hold the foot throttle steady over good roads and bad alike, it is stated. The shape and arrangement of this foot rest prevents tiring and cramping of the foot and the marring of the floorboard by the heel. The price is $1.

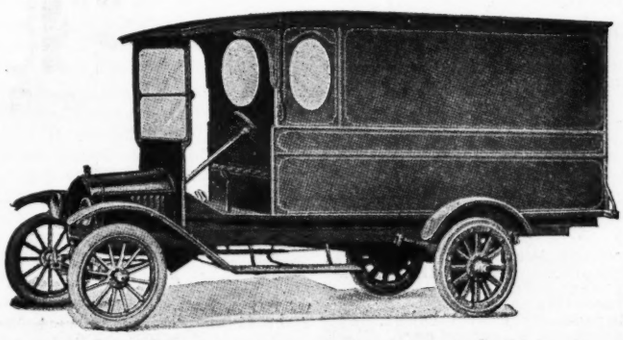
In addition to the foot rest the company markets the Continental steam vulcanizer compact device which is small enough to carry in the pocket and yet large enough, the manufacturers say, to vulcanize tubes efficiently and quickly. It will not scorch the patch or burn the tube, as the patch is surrounded by live steam which cures the rubber.



The Continental foot rest for $1

Patriotic Radiator Emblems

The Art Metal Works, Newark, N. J., is marketing a complete line of radiator emblems in flag and shield forms, eagles, Uncle Sam, etc. One of the most popular forms is called The Five Allies and represents the flags of America, France, Britain, Italy and Belgium neatly mounted on a five-piece steel holder. Every flag is eye-letted and wired to its staff. The American flag is 4 by 6 in. and the others, 2¼ by 3½ in. The price for this set is $1.70. The most expensive emblem is $7.50 and represents a massive eagle surmounted by five allied flags. The eagle and holder is 6 in. high and 11 in. wide, finished in nickel or gold. All of the flags are turned and hemmed at the edges to withstand the steady hard blow to which they are subjected. All holders are attached by drilling a small hole in the radiator cap and inserting the threaded end of the holder, after which the nut is tightened.



One of the Harberer commercial bodies for extended Ford chassis and other makes

Haberer Commercial Bodies

Commercial bodies for extended Ford chassis and other makes are being made by Haberer & Co., Cincinnati, Ohio. This concern is in a position to make or has on hand, bodies for nearly every purpose that the commercial car is subjected to. The handy slip-on bodies for Ford roadsters which this concern makes comprise a removable box body, full side panel body with doors, flare board body with top and curtains, cattle rack flare board body and a demountable flare board body. These bodies are intended to be mounted behind the seat on the Ford roadster. In addition to these there are bodies of the express and panel type, to be fitted upon the regular Ford chassis. Those bodies intended to be placed upon Ford and other chassis when equipped with an extension unit, are naturally of a heavier construction and come in various styles from a staked express body to a full panel body like the one shown in the illustration. The latter body is called the No. 100 full panel body and has a loading space on the inside of 45 by 110 by 60 in. This body is built with steel panels, the frame being lined with felt to deaden the sound. There are double doors in the rear with large oval glasses. It is painted in Brewster green and neatly stripped. The net weight is 630 lb. The company also furnishes rain-vision windshields and fenders for trucks.

Johnson's Freeze Proof

This is a new compound recently introduced by S. C. Johnson & Co., Racine, Wis., to be put into the water of radiators to prevent freezing in the winter time. In using the substance the radiator is first cleaned thoroughly with a solution of common soda in water after which the contents of the package are dissolved in 2 gal. of pure water. It will dissolve immediately in hot water and requires but 5 or 10 min. in cold water. This solution is then poured in the radiator of the car and the radiator filled up with clean water. It is said, that the car is now in shape to go through the entire winter without the danger of the radiator freezing. The substance will not evaporate or injure the metal of the radiator or engine. Rubber is also unaffected by it. It is necessary to replenish with freeze-proof only to meet a lower temperature or where the compound is lost, through the overflow or leak in the radiator.

From the Four Winds

"SOME COLD DAY IN JUNE"—This picture was taken June 18 and shows the first car through from Hamilton, Mont., to Wisdom, Mont., on the Park-to-Park road, which passes by Big Hole battleground. This opened the road for trucking and tourist travel

PENNSYLVANIA Fees Are $3,000,000—Receipts of the Pennsylvania state highway department for 1917 motor car licenses have gone over the $3,000,000 mark, breaking all records.

Texas Registers 239,312 — Reports from Texas counties show that up to July, the latest date at which figures are available, 239,312 cars had been licensed, a gain amounting to 22 per cent.

Road Material Will Be Delivered—The advisory commission of the Council of National Defense has assured the Kentucky representative, A. B. Rouse, that freight cars in sufficient numbers to carry stone for an uncompleted section of the Dixie Highway in Boone County will be supplied by the Queen & Crescent railway. The Dixie Highway is to be used as a military road between the army post at Fort Thomas and Camp Taylor at Louisville.

Good Roads Men Make Inspection Tour—As the first step toward providing a patrol and maintenance system for roads in Franklin county, Ohio, a good roads party visited West Virginia, Pennsylvania and Maryland in a four-day tour. Some of the best examples of road building and maintenance in America were along the route. In the party were the county commissioners-elect, the county commissioner, the county engineer-elect, the assistant county engineer, the county auditor, the manager of the Columbus Automobile Club, and others.

To Promote New Indiana Road—An organization has been formed to promote the construction of an improved highway from Evansville to New Albany, Ind., a distance of 150 miles. Louis N. Savage, Rockport, Ind., is president; James T. Cutler, Evansville, secretary; and Walter F. Hutsteiner, Perry county, treasurer. Vice-presidents for each of the counties through which the proposed highway will pass were chosen as follows: Vanderburg county, Andrew C. Richardt; Warrick county, Dr. Dalton Wilson; Spencer county, D. E. Cadick; Perry county, Walter F. Hutsteiner; Crawford county, S. E. Gaines; Harrison county, J. L. O'Bannon; Floyd county, Evan B. Stotsenburg, former attorney general of Indiana.

N. O. T. Meeting Aug. 16-17—The annual meeting of the National Old Trails Road Association will be held at Pueblo, Cal., Aug. 16-17. Among the speakers are Judge J. M. Lowe, Kansas City, Mo., president of the Association; Harry B. Hawes, St. Louis, Mo., author of the Missouri good roads law, and Dean Walter Williams, Columbia, Mo.

Wisconsin to Use Convicts on Roads—Wisconsin has authorized, through its legislature, the use of prison labor in the construction of permanent highways. Such labor has been used before under the state-aid plan.

Illinois Fees May Be Two Million—Up to July 1 the state of Illinois had issued licenses for 283,182 motor cars; 10,785 motorcycles; 3,397 dealers, and 33,713 chauffeurs. The money received in fees aggregated $1,353,061. It is estimated by Secretary of State L. L. Emmerson that the total receipts for the year will reach $2,000,000.

Washington Improves Old Military Road—The old military road over the Cascade mountains in Washington by way of the middle fork of the Willamette river will be improved by the United States Forest Service this month to make it possible for cars to cross the summit in safety. About 26 miles of road will be placed in first class condition.

St. Louis Plans Second Open Week—The Second Annual Open Week is under consideration of the show committee of the St. Louis Automobile Manufacturers' and Dealers' Association. "Open Week" last year was the occasion of special displays and decorations by all St. Louis dealers. It was organized to take the place of what previously had been a fall show during Carnival Week. The prominent feature was a "give the other fellow a chance" by having cars waiting at the door to take any inquirer to a rival's showroom.

Increase of Cars in Manitoba—Manitoba has now a total of 15,975 cars against 11,352 in 1916 and 9250 in 1915. Of these 15,201 are private, the rest dealers' and the trades'. There are now 1323 chauffeur's licenses in the Province. The increase over last year in licenses in Manitoba is almost 50 per cent. The total number of motor car licenses in Saskatchewan for 1917 is 27,352, an increase of 13,503 over last year's list of 13,849, while in 1915 the number totalled 9197. In the Province of Alberta the totals are as follows: 1915, 5835; 1916, 9211; 1917, 16,458.

Pennsylvania Builds Military Road—The Pennsylvania state highway department has undertaken the construction of a military road at Mount Gretna camp for the adjutant-general. Heavy supply trains, artillery and cavalry will use this road. Work began July 1 and advanced at the rate of about 2 miles of water-bound macadam, 16 ft. wide, each week. Twelve traction engines, ten road rollers, thirteen scrapers, thirty-one dump wagons, twenty-two motor trucks, nine sprinkling carts and many small tools were used. About twenty carloads of materials arrive daily for the work.

Quebec Takes Inventory of Its Cars—The Province of Quebec Automobile Bureau had issued up to June 1st 1112 licenses. The number of licenses issued during the whole season of 1916 was only 1064, and, judging by the above report, the district of Quebec alone will have more than 2000 cars before the season is over. In 1915 the Province had 10,112 cars; in 1916, 15,335, and it is expected it will have more than 20,000 by the end of 1917. The four-cylinder car was the most popular in 1916; there were 13,854 of them. Then came the six-cylinder with 1121; the eight-cylinder, 93, and the twelve-cylinder, 24.

Coming Motor Events

CONTESTS

Aug.	17—Flemington, N. J., track race.
Sept.	3—Uniontown, Pa., speedway race.
*Sept.	3—Cincinnati, Ohio, speedway race, championship.
Sept.	6—Red Bank, N. J., track race.
Sept.	8—Hillclimb, Pike's Peak, for stripped stock chassis.
*Sept.	15—Providence, R. I., speedway race, championship.
Sept.	22—Chicago speedway race.
Sept.	28—Trenton, N. J., track race.
*Sept.	29—New York speedway race, championship.
Oct.	6—Danbury, Conn., track race.
Oct.	6—Uniontown, Pa., speedway race.
Oct.	15—Richmond, Va., track race.
*Oct.	13—Chicago speedway race, championship.
Oct.	27—New York speedway race.

*A. A. A. championship award event.

MEETINGS

Sept. 12-14	Atlantic City, N. J., Motor and Accessory Manufacturers, mid-season meeting.
Oct. 9-11	Pittsburgh, Pa., National Association of Purchasing Agents, annual congress.

SHOWS

Sept. 2-9	Spokane, Wash., Interstate fair.
Sept. 9-15	Milwaukee show, State Park fair, West Allis, Wis.
Sept. 17-24	Grand Rapids, Mich.
Sept. 22-29	Chicago, Ford accessories.
Oct. 1-6	Buffalo, N. Y., closed cars.
Oct. 13-28	Dallas, Tex., state fair.
Jan. 5-12	New York.
Jan. 19-26	Montreal, Canada.

Among the Makers and Dealers

SAXON Leases Old Abbott Plant—The Saxon Motor Car Corp., Detroit, has leased a plant formerly occupied by the Abbott Motor Corp. This plant has 60,000 sq. ft. floor space.

Bowman Leaves Federal Truck—J. F. Bowman has resigned as sales manager of the Federal Motor Truck Co. Mr. Bowman was with the Federal company for five years.

On Display But Not on Sale—The Dorris Motor Car Co. has placed on exhibition a car that is not for sale. The placard says: "The first Dorris, built in 1905. Has run 200,000 miles."

O'Neil Tire & Rubber Expands—The O'Neil Tire & Rubber Co. has increased its capital from $25,000 to $100,000. Ground has already been broken for the erection of a new building covering 20,000 sq. ft.

Studebaker Makes Changes at Branches—W. F. Backes, assistant manager of the San Francisco branch of the Studebaker Corp., has been made active manager, succeeding Earl R. Carpenter, who has been made manager of the Missouri branch.

Eaton Leaves Cadillac to Join Leland—J. M. Eaton has resigned as head of the welfare department of the Cadillac Motor Car Co. and has become associated with Henry M. Leland, formerly with the Cadillac company, in his airplane development work for the United States government.

Levey Starts Wholesale Supply—William B. Levey, formerly buyer for the Service Motor Supply Co., has formed a new wholesale motor car supply house, selling exclusively to both jobbers and dealers. The name of the new concern, which is located in Chicago, is Square Deal Williams, Inc.

Globe Truck Opens St. Louis Office—The Globe Motor Truck Co., East St. Louis, Ill., has established a salesroom in St. Louis with Walter F. Sheehan, vice-president of the company, in charge of the sales. The Globe company is owned chiefly by St. Louisans and David F. Marks is president.

Nordyke & Marmon Promotes Ritter—Dwight S. Ritter, for five years connected with the buying department of the Nordyke & Marmon Co., last week was made purchasing agent, a newly created position. The company's increased business brought about by its contracts to manufacture airplane motors for the government has necessitated a reorganization of the office force.

Gorey Distributing Warner Gears—J. C. Gorey & Co., New York, have placed an order for $11,000 worth of Warner gears for immediate distribution to users in the East. J. C. Gorey, who contracted for this business on a recent trip West, also signed up to distribute Peru axles in the East and at the same time opened up negotiations with Golden, Belknap & Schwartz, engine manufacturers; Detroit Gear and Machine Co.; Universal Products Co., and the American Rotary Valve Co.

Individual Name Plate for Hal—The new name plate for the Hal Twelve is designed by the artist, Maxmillian Fischer, to incorporate the seven leading qualifications of the car. The motif is as follows: Eagle, symbol of smooth power; stars, attainment in American motor car manufacturer; fleur de lis, beauty; diamonds, value and worth; lion, strength; greyhound, grace and agility; and Mercury, speed. The design is stamped on an escutcheon of copper, the fleur de lis, stars, diamonds and wings of Mercury being in white enamel, while the background for the lettering of the car's name is in green. The other figures are in relief against the copper base.

TALKS TRUCK IN NIPPONESE—It is impossible to set forth the selling arguments put forward here, as no typesetting machine is available to tell the story in the spectacular marks employed. Denichi Morimoto operates under the direction of the Roberts Motor Car Co., Oregon distributer for the Republic truck, and sells to Japanese

Lasure Friction Elects Officers—The Lasure Friction Clutch Co., Watertown, Wis., which succeeds the Lasure Clutch Co., Madison, Wis., and is occupying its new works in Watertown, has elected the following officers: President, R. L. Richardson; vice-president, A. D. Platz; secretary-treasurer, B. M. Parsons. The new company is capitalized at $60,000 and employs about twenty workmen.

Specially-Equipped Cars for Japan—Four specially equipped cars were shipped by the Haynes Automobile Co., Indianapolis, Ind., last week to Tacoma, Wash., to be transported from there to Yokohama, Japan. The cars were sold by the company's export agents in New York and were equipped with right-hand drive and special speedometers. They were shipped knocked down, each being placed in a large box. The company reports that the Oriental and South American demand for cars is exceptionally good at this time.

Continental Plans Service Stations—The Continental Motors Corp. is making plans to open depots for parts and service in Boston, Philadelphia, Kansas City and Chicago. The great number of Continental motors in use throughout the country has lead the makers to establish part stations to insure more prompt delivery of parts to distributors, dealers and owners of cars which are equipped with this motor. According to an official of the Continental company, one of the principal objects in establishing these part stations is not only to relieve distributors and dealers from carrying a large stock of parts but to render to the vehicle manufacturers using its engine an effective aid in the promotion of sales.

Pfeffer Now Comptroller for Saxon—Clarence A. Pfeffer, formerly vice-president of the Chalmers Motor Co., has been appointed comptroller of the Saxon Motor Car Corp. Mr. Pfeffer's appointment is in line with the consumation of the refinancing plans which have been previously discussed.

Quadruple-Drive Chassis Out Soon—The first models of the new quadruple-drive passenger and truck chassis to be manufactured by the Wisconsin Duplex Auto Co., organized recently at Clintonville, Wis., with a capital stock of $500,000, are now being completed in a Milwaukee machine-shop by William A. Besserdich, designer of the duplex transmission system, assisted by his son, Shirley Besserdich. Mr. Besserdich was one of the founders of the Four-Wheel-Drive Auto Co., Clintonville, but withdrew some time ago to manufacture a new design. A plant will be built soon.

Novo Engine Increases Capital.—The Novo Engine Co., Lansing, Mich., has increased its capitalization to $1,000,000 and declared a 200 per cent stock dividend with a cash dividend of 10 per cent. Officers elected are: President, R. H. Scott; vice-president and general manager, Clarence E. Dement; secretary, Harry C. Teel; treasurer, Donald E. Bates; assistant secretary, B. R. Hoadley; assistant treasurer, E. J. Bement; general superintendent, Eric Teel. In the election of officers Clarence E. Bement is advanced from secretary to vice-president. The annual report shows that the 1916 business was the company's record. The company, in its 1916 building campaign,

expended $250,000 in increasing its manufacturing facilities. The pay roll has increased 50 per cent in the last twelve months.

Racine Rubber Increases Capacity—The Racine Rubber Co., Racine, Wis., which is controlled by the same interests as the Ajax Rubber Co., Trenton, N. J., has awarded contracts and started work on a three-story addition, 100 by 700 ft., with a wing, 50 by 60 ft., and a new power plant, 50 by 75 ft. When these facilities are available, the output will be increased 25 to 35 per cent.

Saxon Closes Large Contracts—The Saxon Motor Car Corp. has closed a contract with the Loveland company as Saxon distributor for Detroit, Cleveland and Buffalo, amounting to $1,732,000. The company also has closed contracts with the Hathaway Motor Co., Kansas City, and with Philadelphia and Des Moines distributors for more than $1,000,000 each. Other contracts have been closed in Albany, Cincinnati, Columbus, Hastings, Neb., Richmond, Dayton, Ohio, and Oklahoma City.

Appleton Body Concern Expanding—The Appleton Auto Body Co., Appleton, Wis., has increased its capital stock from $10,000 to $25,000 preparatory to erecting a complete new passenger and freight motor car body plant. The present works, established in February, have been outgrown. Work started Aug. 1 on a two-story fireproof factory, employing between sixty and seventy-five operatives. It will be ready Oct. 1. J. L. Tollefson and R. A. Schwartzburg have taken an interest in the company.

Production Hampered by Material Shortage.—The working force and production of the Harroun Motors Corp., have been reduced on account of shortage of certain materials. A batch of 500 cars is being worked through, full parts being on hand for that number. It is expected that by the time these are finished sufficient supplies will be on hand to start an equal number through the shop. Ray Harroun has been in Washington recently, which is taken as an indication that the Harroun company seeks munition orders, for which the government guarantees sufficient material.

How Firestone Tests Its Tires—The Firestone Tire & Rubber Co. has from 250 to 300 cars being driven constantly in all parts of the country, putting Firestone tires to the test. These cars are driven by salesmen, branch managers, factory representatives and other employees of the company and meet all kinds of weather, roads and climate. In the West the cars are driven over rocky mountain trails which are not much more than trails. There are cars on the sands of Arizona and New Mexico, in the rains of Oregon and Washington, in the hills of Vermont, Virginia and Tennessee and in the lowlands of the Mississippi valley. Monthly reports to the home office give mileage, service and condition of tire, and roads and weather. From these records the serviceability of the tire is determined.

Reo Buys Capitol Auto Co.—The Reo Motor Car Co., Lansing, Mich., has purchased the plant and business of the Capitol Auto Co., Lansing, Mich., and took possession this month. Clarence Triphegen, formerly with the Chevrolet, at Flint, will be in charge.

Pierce-Budd Plans Airplane Engines—The Pierce-Budd Motor Co., marine engine manufacturer, has reorganized and plans to manufacture airplane engines. The Pierce-Budd Co. now occupies part of the factory owned by the Union Truck Co., but the latter company finds that the space is necessary for its increased output and plans expansion.

Herrington Heads Aero Cushion Tire—B. A. Herrington has become president of the Aero Cushion Tire Co., San Jose, Cal. This company has gone under new management and has made several other changes. A. P. Marston has become vice-president; W. P. Wohlheter, secretary; E. L. Sherbondy, general manager; and J. J. O'Shannesy, general agent. E. L. Sherbondy is the inventor of the aero cushion tire.

Michigan Drop Forge Elects—The following officers were elected at a meeting of the directors of the Michigan Drop Forge Co., recently: President, B. T. Esgar; vice-president, Hugh O'Connor; secretary and treasurer, Paul A. Leidy. At the meeting it was brought out that the earnings of the company have been approximately $5 a share for the year ending Jan. 31 on the common stock.

Haupt Heads Ten Broeck Tyre—Fred Haupt has been elected president of the Ten Broeck Tyre Co., to succeed the late Harry L. Lewman. Mr. Haupt has been vice-president and was one of the organizers with Mr. Lewman. Winn Lewman has been elected general manager; W. N. Cox, treasurer, and Frank E. Trumper, secretary. All have been identified with the company for some time. The company is adding to its plant and is working a double force to take care of business. Its most important addition is a cotton plant to manufacture its own fabrics.

Motor Products Sells Rand Plant—The Motor Products Corp. has sold the Rands manufacturing plant at a figure in excess of its book valuation. The Rands plant has been used for the past six months by an outside company and its sale in no way affects the production of the Motor Products Corp. The gross business of the Motor Products Corp. now is running at a rate of $10,000,000 per year, with net earnings at $10 per share.

Abbott in Cleveland Plant Now—The Abbott Motor Corp., formerly of Detroit, has taken full possession of its new factory at Cleveland, Ohio. The company leased a factory for ten years at $13,082 with an option to purchase at any time for the cost of the land and building plus 6 per cent of the total.

Wayne Wheel in Factory Soon—The new factory building for the Wayne Steering Wheel & Bow Co. is nearly completed, and the machinery will be installed in a few days.

Lang Body Co. to Build—The Lang Body Co., Cleveland, Ohio, has purchased 5 acres of land on which to build. The first of a series of buildings, to cost $100,000, will be erected and used for the construction of truck, passenger car and airplane bodies.

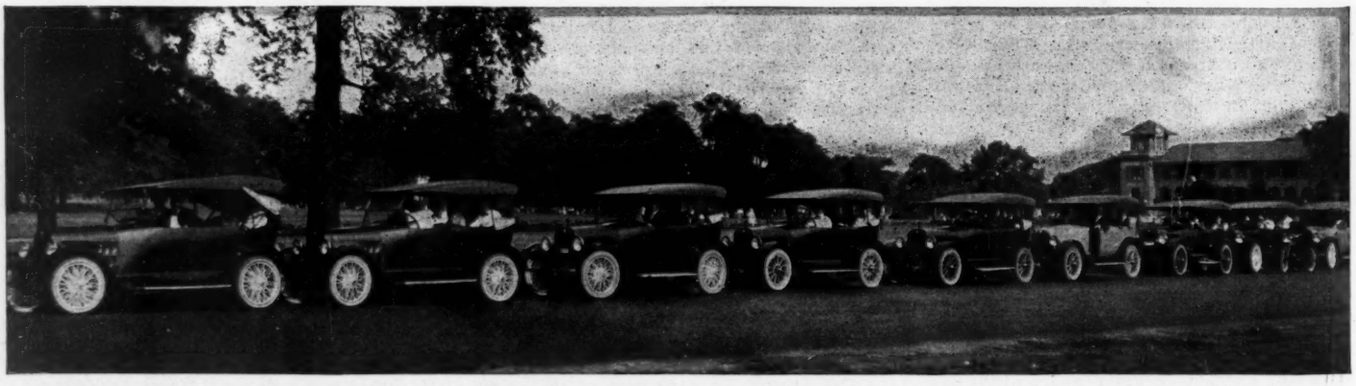
Triangle Truck Building Plant—The Triangle Motor Truck Co., St. Johns, Mich., has completed plans for a new building 70 by 236 ft., that will be finished about Sept. 1. At the start, the company will manufacture a 1-ton and a 1½-ton truck.

Speck Joins U. S. Truck—John S. Speck has been appointed factory engineer and assistant chief engineer of the United States Motor Truck Co. Mr. Speck for six years has been the factory engineer of the Federal Motor Truck Co. of Detroit.

"Every Goodyearite for Uncle Sam"—The Goodyear Tire & Rubber Co.'s factory school has launched a campaign for which the slogan is "Every Goodyearite for Uncle Sam." The end sought is an All-American Goodyear. The whole organization is behind the movement for more citizens, which involves a direct personal appeal to every alien workman, and it is expected that a majority of Goodyear's 3000 foreign-born employees soon will be naturalized.

Canadian Chalmers in Temporary Building.—The Chalmers factory at Walkerville, Ont., recently destroyed by fire, has been replaced temporarily by a new frame structure covering 21,000 sq. ft. of floor space. Work commenced soon after the fire on the new building, which was completed in twenty days, manufacturing operations being started and in full swing at the expiration of that brief interval. It is expected that with this new factory the plan for a tremendous manufacturing output scheduled for this year will be continued.

Yellow Taxicabs at St. Louis—The Yellow Motor Car Co. has been incorporated at St. Louis to enter the taxicab field. A garage, 130 by 150, with capacity for 80 cars, was opened Aug. 13. The company is a subsidiary to the Yellow Taxicab Co. of Chicago and will be operated on the same plan. The rates are 30 cents for the first ⅓ mile, 10 cents for each additional third and time rate of $2.50 an hour, about one-third less than local rates. J. W. Waller, for nine years with the St. Louis Taxicab Co., is manager and W. W. Keyser, formerly purchasing agent for the National Bank of Commerce, is secretary and treasurer. Waldon W. Shaw of Chicago is president.



CHAMPION "PLUGGERS" STUDY PLUG MANUFACTURE—Here are fifty Champion spark plug "pluggers" on a sight-seeing tour of Belle Island Park, Detroit, after having made an inspection trip through the Jeffery Dewitt Co. factory, where the porcelains for the Champion plugs are made. Ten Columbia cars conveyed the party around the city